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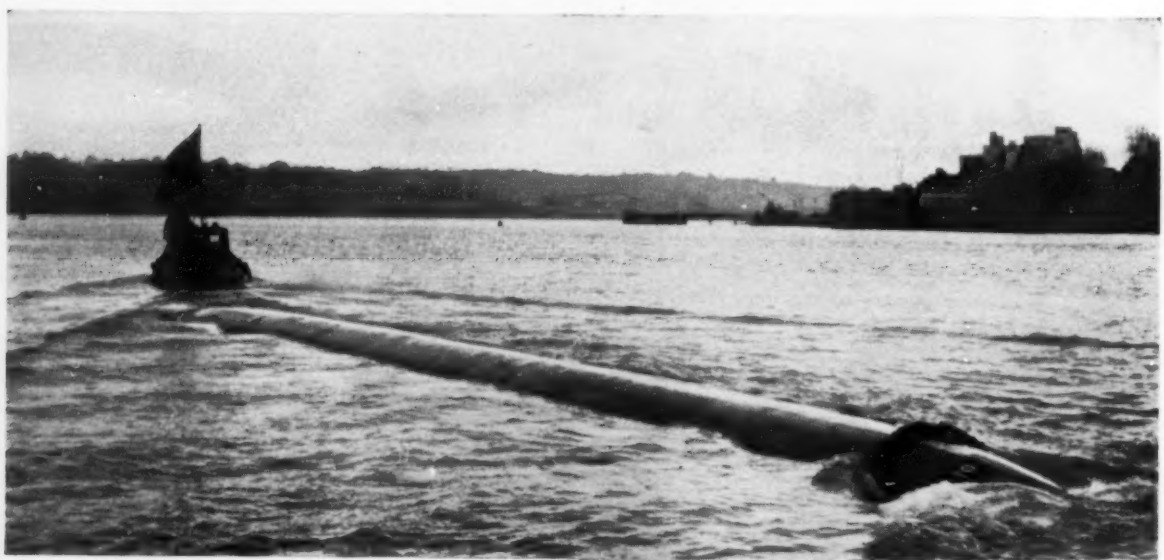

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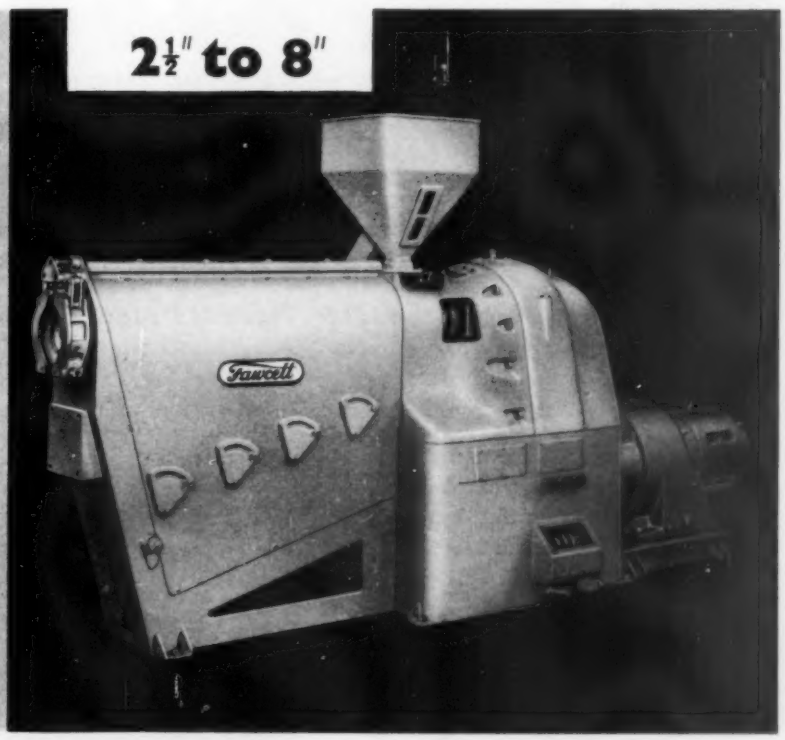

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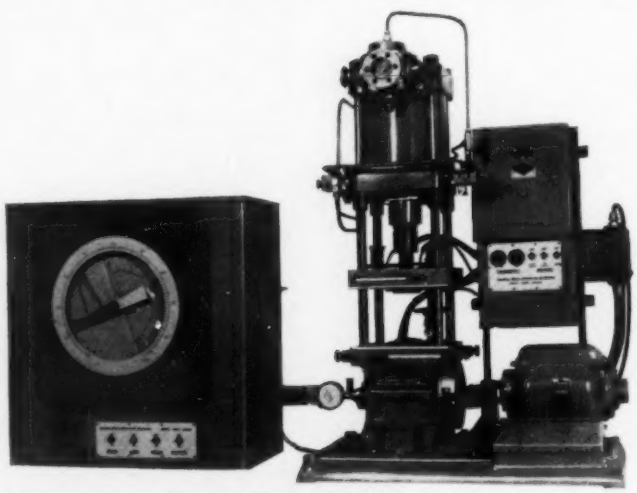

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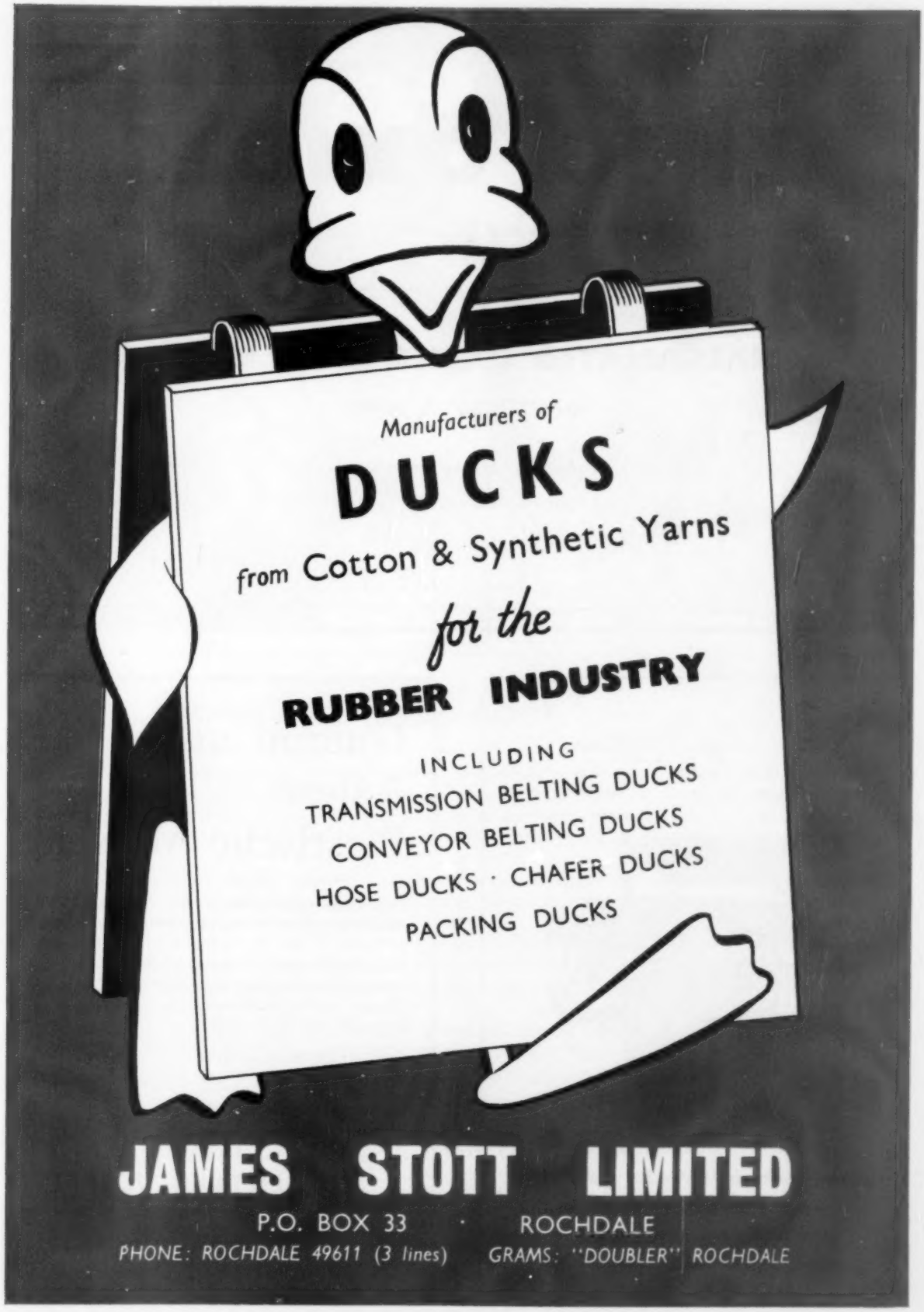
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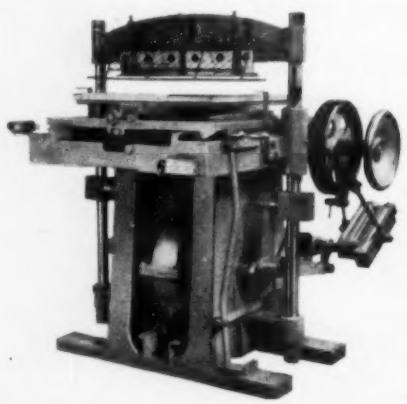

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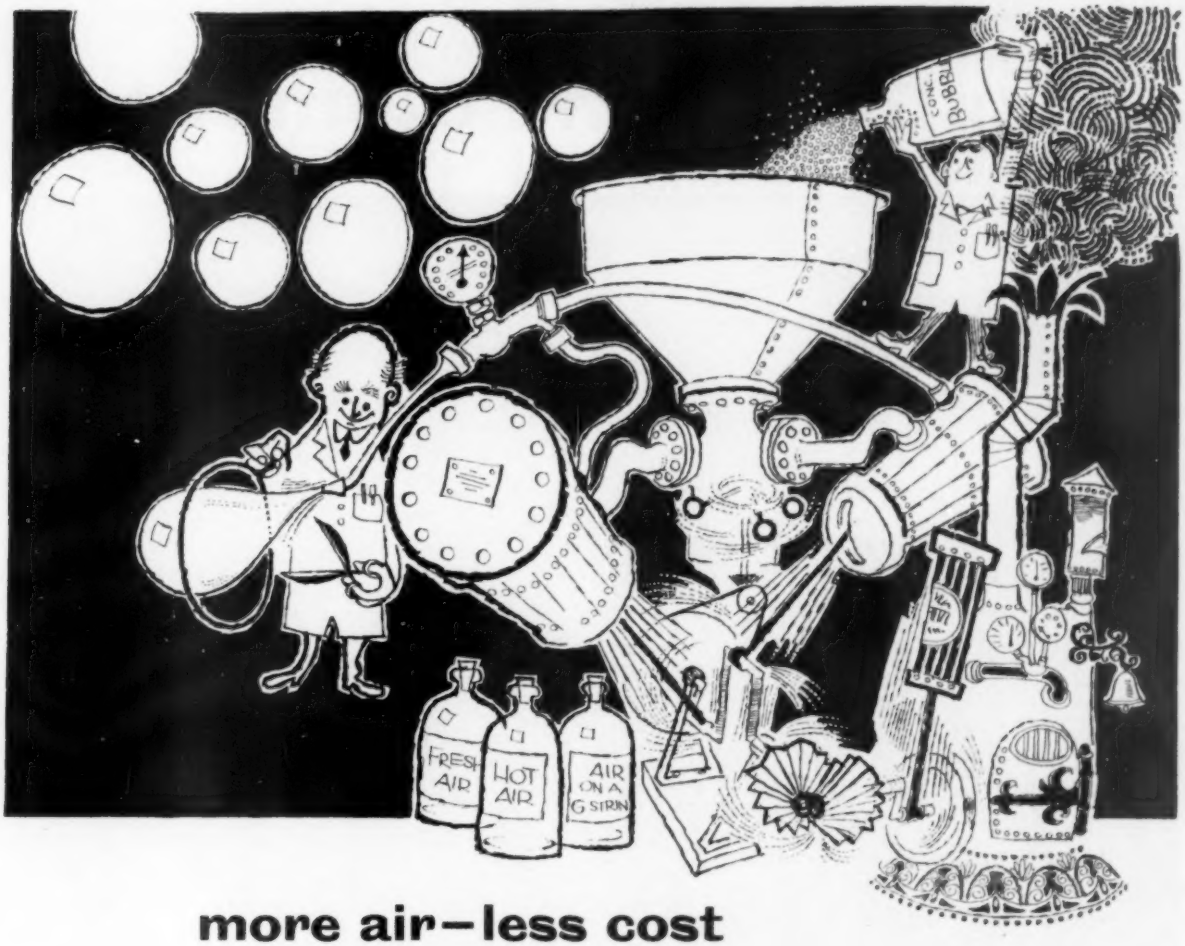

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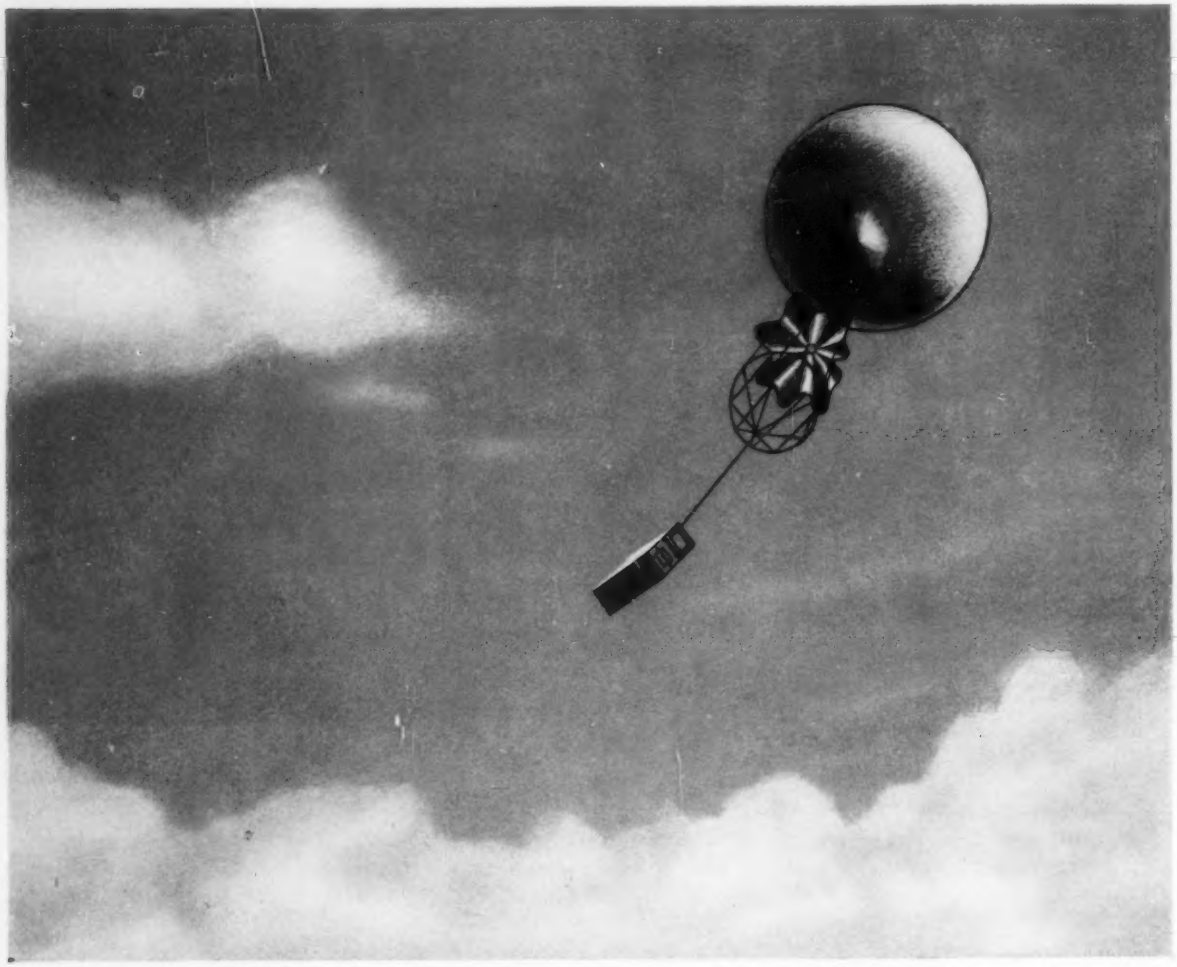

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Rubber Journal and International Plastics

Volume 138 Price 1s. Post free 1s. 4d. No. 4

IN ITS 76th YEAR

January 23 1960

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OVERSEAS AGENTS THROUGHOUT THE WORLD

P3549

NOTES of the WEEK

Capital Expenditure

LATEST estimates of fixed capital expenditure in 1960, made from forecasts sent to the Board of Trade by a sample of companies at the end of 1959 indicate that private industry and business now plans to spend 14% more than in 1959 on fixed assets for use in manufacturing industry and about 20% more on assets for other industries and services. Taken together, capital expenditure by these two broad groups of industries is now expected to rise by 16% in contrast to the slight fall forecast from the inquiry made last summer. A substantial part of this large revision, which is much greater than has occurred before between successive estimates for a given year is, however, accounted for by the steel and the motor industries. If the estimates for these industries are excluded, expenditure by the remainder of manufacturing industry is expected to be about 4% higher in 1960 than in 1959, instead of the earlier estimated 5% lower.

Proceed with Caution

SOME caution, however, is needed in accepting the latest indications of so sharp a change in expected expenditure in 1960. Experience suggests that when a significant increase in capital investment is being planned achievements may well fall short of intentions. It should be borne in mind also that the estimates for 'other industries and services' are based on forecasts made in the main by large companies only, whose expected expenditures may not be typical of the smaller businesses which account for an important part of this group of industries. There are other aspects of the economic outlook for 1960 to be considered. In his statement to shareholders circulated this week, Sir Thomas Barlow, chairman of the District Bank, said that 'despite creditable progress, our economy requires more toning up. Although the outlook is much brighter than it was 12 months ago, it would be unwise to be complacent.' He goes on to describe the country's position as strong but far from impregnable. But, he adds, if we rule out an unexpected downward swing of fortune, any serious deterioration would only arise if we experienced all at the same time pressing demands for consumer goods, capital goods and exports. There is a link here with the capital expenditure estimates mentioned above. Such an investment programme as estimated could cause considerable difficulties for the suppliers of capital goods and create bottlenecks; industry may not be able to spend as much as it would like.

How Much?

WHEN an outbreak of fire occurs, destroying, say, stock and equipment the value of which has been written down, so that the sum received from the insurance company represents the original higher value, the question can arise as to which amount, the larger or the smaller, should be returned for tax purposes. In a leading case on this point, these were the facts : a firm had written down, substantially, certain portions of its stock because of falling prices. A fire occurred and everything was totally destroyed, It returned for tax not the insurance money received but the reduced book value, the argument being that it was entitled to such relief as set-off against the premiums paid. The Special Commissioners accepted this view. The tax authorities appealed, and in the High Court won. The firm went to the Court of Appeal, which upheld the High Court, and finally to the House of Lords, which decided similarly. The contention in such a case is that the goods have gone from the possession of their owner and money has been received for them. By what means they went is immaterial, and in this sense 'fire' or any other agent of removal is a "customer," and in effect any insurance money received is the price paid by the customer. The normal trade practice is to return for tax the amount actually received under a policy, and that method was endorsed by the Lords' ruling.

Joint Consultation

DUNLOP have recently celebrated 40 years of joint consultation. The first machinery to establish communications between management and the general body of employees was set up at Fort Dunlop at the end of 1919. Since then, it has been standard practice for every sizeable Dunlop establishment to have its recognized machinery for communications. While working conditions and general welfare schemes have occupied much of the committees' time, they have recognized that peoples lives are affected by the decisions taken at their place of work. Factory and home cannot be separated. Countless families have been helped with health and other personal problems through the years and the one guiding principle has always been that all men should be considered as individuals. These committees have proved to be a resounding success over the past 40 years. They made themselves respected as models of commonsense and forward thinking by everyone in the Dunlop organization and they have built up a reputation not only in the rubber industry but in industry generally.

NEWS *Briefs*

RUSSIA SELLS RUBBER — ITALIAN IMPORTS
AUSTRALIA CRACKER — INDONESIA REPLANTS
JAPAN AND MALAYA TALK — CZECH TERYLENE

●**Russia**—A spokesman for the Soviet trade delegation in London has said that official confirmation of a release of rubber stocks had been received from Moscow. Up to 50,000 tons of rubber would be sold from Soviet stocks to industry in Soviet Bloc countries during the first quarter of this year. Sales would be spread evenly over the three months. The exhaustion of available warehouse space was the reason for the disposal, the spokesman said.

●**Australia** — Major item in Royal Dutch/Shell expansion is a catalytic cracking unit, costing £A17m., at Clyde, near Sydney. The unit, which will have an annual capacity of 150m. tons of motor spirit, will also provide a supplementary feedstock for the new £A10m. ethylene manufacturing and purification plant jointly announced last month by Shell Chemical and Imperial Chemical Industries of Australia and New Zealand.

●**Italy**—Italy's proposed liberalization of further imports from the dollar area is expected to cover, among other items, natural and synthetic rubber goods, according to unofficial reports circulating in Foreign Trade Ministry circles in Rome. An official statement is expected shortly.

●**Indonesia**—The Indonesian Government is starting a programme to encourage rubber smallholders to replant. The Agricultural Department is providing smallholders with high-yielding seeds, chemical fertilizer and information on new scientific planting methods. The programme operates for smallholders only, not for estates.

●**Japan** — The Japanese Foreign Ministry announced on January 18 that Japan and Malaya would open talks in Kuala Lumpur on February 8 for the conclusion of a long-term agreement on commerce.

●**Czechoslovakia**—I.C.I. has sold the patent rights for Terylene in Czechoslovakia to a Czech producer for £220,000.

●**Australia** — Ampol Petroleum expects to be marketing Goodrich tyres in Melbourne ahead of schedule on March 1, according to Mr L. J. Thompson, Ampol's chairman, in an address to his company's annual meeting in Sydney. Concerning this arrangement, Mr Thompson said it was intended to extend activities to the rest of Australia as production mounted.

●**United Kingdom** — A new trade agreement effecting exchanges for the next three years was concluded in London on January 19 between UK and Hungarian Government representatives. The 1960 quota arrangements allow for UK exports to Hungary of £5.5m. and UK imports of £4.5m. The quotas agreed for UK exports include machinery and various chemicals.

●**Australia**—Negotiations have now been completed whereby British Xylonite becomes equal partners with Email in British Xylonite (Australia) which is expected to lead to considerable expansion of the latter. The results of this accord between the two groups are to be made effective immediately. During the war the British Xylonite Company sold the majority of its shareholding in its then Australian subsidiary to Email.

●**France**—Péchiney has formed a new subsidiary with Penarroya, a leading French non-ferrous metal-mining company. Called Afcodur, it will manufacture, process and sell all plastic materials, and particularly sections, tubes and sheets. It will have an initial capital of 50m. francs, divided into 5,000 shares of 10,000, of which each parent company will hold half.

●**United Kingdom**—Output of man-made fibres in 1959 achieved a new record, according to the British Man-Made Fibres Federation. Figures released on January 19 showed production totalled 514m. lb., against only 422m. lb. in the previous year, and the former peak of 495m. lb. in 1957. Records were established for both continuous filament yarn and staple fibre, the filament total at 235m. lb. comparing with 191m. lb. in 1958, and exceeding the previous record year, 1955, when the total was 233m. lb.

●**Russia** — Talks between a Chilean trade delegation and the Soviet Ministry of Foreign Trade, held in Moscow this week, may lead to asbestos being supplied to Russia at $300 a ton, plus $20 a ton freight. The delegation, now in Poland, will move on from there to Czechoslovakia and Hungary.

●**Japan**—Production of Vinylon polyvinyl alcohol fibre is to be stepped up at a number of factories in Japan. The staple form is to be made by the Dai Nippon Spinning Co. of Kobe.

'Nature's glorious gifts being inadequate to satisfy your sartorial lust, you have the effrontery to appear before me clad in* MAN *made fabric — you, you Communist!' — 468

International Rubber Conference

TECHNOLOGICAL PAPERS AT WASHINGTON

THE more academic aspects of the International Rubber Conference held recently in Washington have already been described by Dr W. C. Wake (*RJIP*, December 26). Here a brief account will be given of some of the technological papers.

A paper on an engineering subject was 'New Rubber Techniques for the Sixties.' It was read by Mr Andrew Hale of the well-known firm of Hale and Kullgren Inc.

The main theme was to cut strips of rubber and roll them off the surface of a 2-roll mill. For this purpose it was proposed to use supplementary rolls of 36 or even 60 inches in diameter to cut and curl off the strips; the large roll running in the opposite direction to the mill roll, removes the curled strips. Patents covering this automatic curling mill have been applied for.

The author predicted new techniques for the mill room of the 'sixties involving 'either one shot or continuous mixing process wherein the stock is automatically handled. . . . It is not touched by hand from the time the raw material is taken from the receiving room and reaches its final form. . . .' 'We have eliminated an intermediate pelletizing handling system . . . a second and probably a first Banbury with normally operated sheeting mills.'

By way of a change the third paper had a chemically sounding title. 'Polyurethane Foams' by Mr J. M. Buist of I.C.I. Ltd., Manchester, but the sub-title, 'Basic Equipment for Producing Flexible and Rigid Foams,' showed that in fact it was engineering rather than the chemical aspects which would be discussed. Unlike other lecturers, Mr Buist did not simply read his paper which had already been printed, or even extracts from it but dealt instead with a few aspects of particular interest and this in a refreshingly clear manner.

It was possible, said Mr Buist, to obtain a high output of polyurethane foams but the engineering side was just as important as chemistry. He referred particularly to the effect of air on foam structure. Air reduced the pore size but the effect was often obscure. Four effects had been observed: first, a fine, even structure was obtained with air in solution; second, there was a fine structure but large bubbles; third, the foam was very fine but showed small splits and pressure collapses; fourth, the foam rose, 'boiled' and collapsed.

In the complete absence of air the structure was even but coarse and over-running of the mould took place. A little air improved matters, but it was difficult to introduce in sufficiently small amounts. Air may be dissolved in the isocyanate—the polyester took in too much air. Polyethers could take in air at the mixing head.

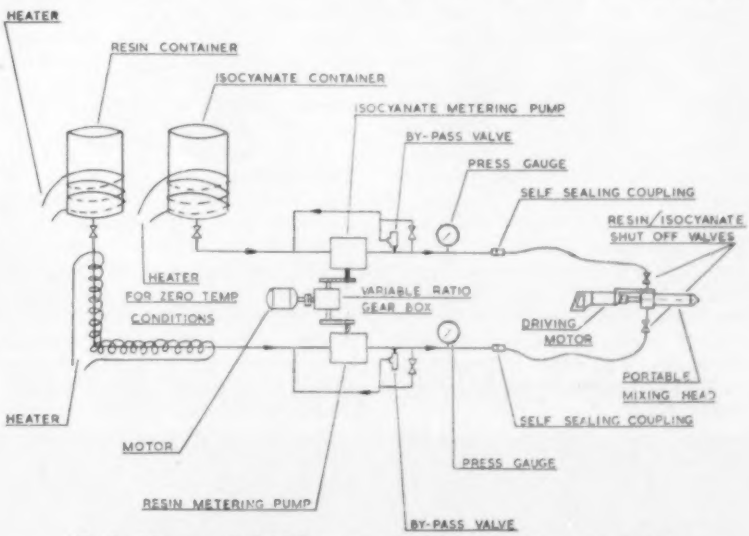
The design of this head was most important. Some machines would work well at low pressures. Mr Buist had come to the conclusion that head design should be as simple as possible —complicated designs did not make for any improvement and rendered cleaning more difficult. There was no evidence that multi-point addition of reagents was advantageous.

The trend was to use higher speeds; in the United Kingdom mixing was carried out at 5,000 to 7,000 rpm. Rigid foam machines might be used for high modulus flexible foams.

Mr Buist's remarks were well received and accompanied by excellent illustrations which will be found in the published paper.

Papers regarding tyres are bound to form an important section of any conference concerned with rubber technology. The first to be read, following the two papers on polyurethanes, was by Mr C. A. Litzler, 'World Wide Development in Tire Production.' This did not give the audience a first-hand account of original work but called attention to the intensive research now in progress in the field of tyres. Mr Litzler's hearers were told, for instance, that ten new fibres suitable for use in tyres have come on to the market during the past 18 years. Amongst these were polyester fibres, and fibres from polyvinyl alcohol which had been used, particularly in Japan, for small tyres. Glass had, so far, not proved successful. The difficulty had been to lubricate the inherently abrasive fibre. A mixed amide and urea polymer fibre known as Urylon was being tried out and in addition to the fibres of known composition, there were some secret materials.

Mr Litzler also referred to the possibility of making tyres without fibres and even without the normal air



Typical layout of rigid foam machine (*Acknowledgments to I.C.I.*)

The paper by J. G. Dipinto and S. D. McCready of Dupont, 'Urethane Polymers as Engineering Materials,' which immediately followed, summarized the physical properties of Adiprene L described as a castable elastomer with a unique combination of high load burning capacity, resilience and extensibility.

inflation, the cushioning medium being a polyurethane foam. Even with the more conventional construction methods, wire fabrics were being employed and tyres had been made with nylon reinforcement inside and a wire reinforcement outside.

Mr George N. Murphy (National Rubber Machinery Co., Akron)

elaborated on 'What Bladderless Curing of Tubeless Tires Can Mean in Increased Productivity,' whilst Messrs J. L. Ernst and S. R. Shuart read a short paper on the 'Construction and Performance of All-Butyl Passenger Tires.'

Further contributions on tyre construction of a more theoretical nature came from Mr W. Hofferberth (Dunlop, Germany) — 'Mechanical Behaviour of the Tire in Dependence on Materials and Construction,' and by Messrs William F. Ames and Herbert G. Lauterbach (Du Pont)— 'Stresses in Deflected Tires.'

In his paper, 'Power Wastage in Tires,' Mr G. B. Roberts (Dunlop, Birmingham) discussed the advantages and disadvantages of indoor tests and of the machines previously used. His contribution was mainly a description of the circulating power machine developed by Messrs E. F. Powell (manager) and H. J. Lawton of the Fort Dunlop Tyre Laboratories (BP 762,805, USP 2,869,361). The uninitiated will find it difficult to decide which was the driving and which the driven part of this machine but Mr Roberts gave a most clear exposition.

Mr R. D. Stiehler was responsible with his colleagues at the National Bureau of Standards, Washington, for two contributions in the tyre section, one on 'Power Loss and Operating Temperature of Tires,' and the other entitled, 'An Indoor Tester for Measuring Tire Tread Wear.' A number of those attending the conference were able to see the latter machine installed in a special building and in operation at the Bureau. The 'roadway' is formed from a steel cylinder 28ft. in diameter and 3½in. high. It is supported by 18 street car wheels, 18 similar wheels functioning as guide rollers. There are 18 tyre stations, the tyres running horizontally against the vertical inner surface of the drum which can be lined with various types of roadway surfacing materials. The whole is housed in a ventilated chamber with control of temperature.

Retreading

It is seldom that the smaller firms in the rubber industry are able to find anything of direct interest in the proceedings of international conferences. A pleasing exception was the lecture by H. Geldorf, of TNO, Holland, entitled 'Optimum Conditions for Retreading Tyres.' Because it has been mainly in the hands of small firms, little or no work has been carried out on processes used and how far current practice gives the best results, has been a matter for guess work. In Holland alone there are about 100 retreading concerns and the tyre may be retreaded three or four times. The adhesion of new tread to the old rubber is most important and Mr Geldorf described a suitable test method. (ISO/TC 45 Recommendation 36.) It was, of course, necessary for the underlayer to be strong enough if the test were to have any meaning. Until this work started, there was no information as to the best methods of retreading and at least 100 and preferably 200 tyres were needed in order to obtain reliable results.

Contrary perhaps to expectations, in general the smoother the surface on the old tyre, the better was the adhesion of the new tread. The smoothness avoids cracks which are a source of weakness. Longitudinal buffing gives the best results. Brushing versus spraying of the cement was also investigated. A statistical investigation had to be carried out on new tyres in order to avoid effects due to variation in the quality of the tyres, even with the same operator. Condensation was not found to be disastrous. The effect of pressure during vulcanization was also studied. Increasing the curing pressure from 6 to 9kg. per sq. cm. improved the quality, but an increase from 9 to 12 made very little difference. The writer of these notes asked how the cement, which is normally a viscous rubber solution, could be sprayed. In reply the lecturer explained that an extremely dilute cement was sprayed and found to give good results. In fact, good results could be obtained by simply spraying solvent without any rubber being present.

Tyre Testing

A towing device for estimating road wear by L. P. Gelinas and E. B. Storey of the Polymer Corporation, Sarnia, described how by this means road behaviour could be assessed using only a very small amount of polymer. The authors considered that both indoor tyre tests and abrasion resistance tests made use of exaggerated conditions, and normal road tests were costly and slow. The test which they described was a rapid starting test and could be carried out in only six hours.

An example of international co-operation was seen in the next paper, 'International Road Testing of HAF and ISAF Blacks in Passenger Tyres,' this being the joint work of O. F. K. Bussemaker, of N. V. Rubberfabriek Vredestein, Enschede, Netherlands, E. M. Dannenberg of Godfrey L. Cabot Inc., Cambridge, Mass., C. Prat of Institut Français du Caoutchouc, Paris, and H. Westlinning, of Degussa A. G., Kalscheuren, Germany. It is difficult to summarize the analysis of the results obtained which occupy 16 pages of the original text. The 'rate of wear' rating of the ISAF tread compounds as compared with those of HAF was found to vary sharply by the surface conditions. The differences were particularly great between Texas on the one hand and England and Germany on the other. English tests involved highly severe conditions during cornering followed by mild conditions on straight runs, whereas in Texas the severity is more constant.

The paper on 'Measurement of Tread Motions and Application to Tyre Performance,' by H. H. Vickers and S. B. Robinson of Esso Research and Engineering Co., Linden, N.J., was a forerunner to a short but excellent summary by Dr A. Schallamach of the British Rubber Producers' Research Association, of his now well-known work, the paper being entitled 'The Role of Hysteresis in Tyre Wear and Laboratory Abrasion.'

(To be continued)

Resin's the Answer

Two important aspects of reinforced resin structures are low tooling costs and ease of moulding, and these features proved useful recently to B.K.S. Ltd., Chertsey. The company were asked to supply their 30-amp 4-pole contactors with covers made in an insulating material instead of sheet metal. The time allowed for this conversion was only four weeks.

The final answer to the problem, it was realized, would be to make the covers in a phenolic moulding material, but the time factor ruled this out because of the lengthy process of making the necessary tools. Reinforced resin covers made from Bakelite polyester resin, were therefore decided upon as an interim measure. The covers were designed and made by the Moulding Division of Coin Insulation Ltd., Woking, Surrey. Wooden moulds were used in a fabrication of the component.

PVC at Design Centre

From January 25-February 20, a display on the upper ground floor of The Design Centre will feature 'Mural Texturide.' This new vinyl-coated fabric has been specially developed as a wall-covering by Arlington Plastics Development Ltd. Textures in this new range include some based on woven grass, rough silk and heavy linen. Colours for the most part are subtle and muted, but there are also rich yellows, reds, greens and blues.

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IRI Manchester

RECORD ANNUAL DINNER AND DANCE

THE annual dinner and dance of the Manchester Section of the Institution of the Rubber Industry was held at Belle Vue, Manchester, on January 15. The number present, more than 470, made this not only a record for Manchester but for any section, including London, for a similar occasion.

There can be no doubt whatever that this was the most successful event of its kind ever held by any IRI section. The Cumberland Suite at Belle Vue proved an inspired choice, and the evening was notable alike for that smooth, and all too speedy, progression which hides the tremendous amount of work put into organization, and for the *bonhomie* so rightly associated with the North.

Members and guests were received by the chairman of the Manchester Section, Mr J. M. Buist and Mrs Buist, Mr J. K. Elliot, Chief Education Officer of Manchester, and Mrs Elliot.

Good Fellowship

In proposing the toast of the Manchester Section, Mr Elliot expressed his thanks not only for the dinner but for the friendly good fellowship he had found. He went on to quote from the aims of the IRI, one of which was, he had read, the promotion of better understanding between all in the industry. Judging from the animation all round, that objective had been fully secured. He referred then to the year 1928. In that year, firms engaged in the rubber industry in the Manchester area, the education authorities and the trade unions had co-operated to start courses for education in the rubber industry. Firms had donated equipment and nominated students. In spite of the 'threadbare thirties,' those students had been guaranteed jobs on their return. Those small but significant beginnings were, he said, a good example of what earnest people could achieve. Now, on all sides, industry and the education authorities could be seen working together for technical education. Industry, he concluded, was becoming more and more dependent on highly trained recruits.

In his response, Mr J. M. Buist said they were grateful to Mr Elliot for his good wishes and for the interest he had taken in the activities of their society this year. 'Your speech,' Mr Buist went on, 'was stimulating and as one who is always of the opinion of the learned, especially if they speak first, I applaud it.

'It is folly to expect men to do all that they may reasonably be expected to do but this did not apply to the present committee and I would like to thank them all most sincerely for the support they have given me this year. In particular I must thank Mr Ernest Morris, your vice-chairman, for the extra work he undertook during my absence in America. Many others have contributed to the success of this evening and deserve our gratitude. Our secretary, Leslie Gill, has been a tower of strength; he works quietly, efficiently, and remains unruffled by the sins of commission and omission of others. The smooth functioning of the Manchester organization is due to the immense amount of work he puts in behind the scenes.'

Mr Buist said he wanted also to take the opportunity to congratulate John Carrington, who was with them, on being awarded the Hancock Medal.

Encouraging Response

This year, he said, was the first time they had held the dinner in Belle Vue. When the committee decided to hold this function at Belle Vue they were concerned with the practical issue of trying to accommodate more members and their friends. The response had been most encouraging, 472 members and friends being present. The committee wished him to thank all those companies who had subscribed to the ladies' gift fund. 'We differ from Dr Johnson in one respect—he said "Sir, I have two very cogent reasons for not printing any list of subscribers: one, I have lost all the names, the other that I have spent all the money." We have spent all the money but our efficient treasurer and secretary had jointly prepared a list. Many loyal supporters of this fund are here tonight and I would ask them to accept our sincere thanks.'

The toast of the ladies was proposed by Mr T. Clyde Hewlett. He was, he said, deeply indebted to the Manchester Section for the opportunity because one of the desires of his life had been to address an india-rubber ball. He went on, in a speech that definitely had its hilarious moments, to say how glad they all were to have the ladies with them.

After receiving a gift from Mr Gill on behalf of the Manchester Section, Mrs Buist, in a charming and effective speech, responded for the ladies present.

Dancing continued, on an excellent floor and to a good orchestra, until people's watches told them, quite incredibly, of course, that the extremely successful evening was at an end.

Donations to the Ladies' Gift Fund from the following firms are very gratefully acknowledged by the Manchester Section: Anchor Chemical Co. Ltd., Bank Bridge Rubber Co. Ltd., Boro Rubber Co. (1912) Ltd., British Geon Ltd., British Recovered Rubber and Chemical Co. Ltd., Dunlop Rubber Co. Ltd., Durham Raw Materials Ltd., Ferguson Shiers Ltd., P. Frankenstein and Sons Ltd., Goodyear Tyre and Rubber (Gt. Britain) Ltd., Greengate and Irwell Rubber Co. Ltd (Irwell Works), Hubron Rubber Chemicals Ltd., I.C.I. Ltd. (Dyestuffs Division), Lafotex Ltd., Lindsay and Williams Ltd., Monsanto Chemicals Ltd., Newcol Ltd., New Consolidated Mines of Cornwall Ltd., Phillips Rubbers (Manufacturing) Ltd., Precision Rubber Products (Denton) Ltd., Redfern's Rubber Works Ltd., Rotunda Ltd., Rubber Latex Ltd., Rubber Regenerating Co. Ltd., Shell Chemical Co. Ltd., Sutcliffe Moulded Rubber Co. Ltd., F. Thompson and Co. Ltd., Travis Industries Ltd., Vitafoam Ltd., Volcrepe Ltd., Witco Chemical Co. Ltd.

Pictures of the Manchester Section IRI dinner and dance will appear in next week's issue of *RJIP*.

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I.C.I. Plastics Division are to increase polythene production by approximately 15% in 1960, bringing the annual output to about 105,000 tons. The supply position in the UK will be further improved by redeployment of I.C.I.'s total sales. As a result of the completion of new I.C.I. plants in India and Australia, and increased production in France and Germany, more polythene will be available for home distribution.

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Nylon for Injection Moulding

MANY ADVANTAGES OF SOLID FORM

NYLON, best known as a textile fibre or as a brush tufting material, has in recent years aroused increasing interest in its solid form for the manufacture of many mechanical parts, combs, aerosol dispenser components. In this solid form, the tensile strength and rigidity are lower than those of the metals (Table 1) but its inherent qualities of resilience, self-lubrication and corrosion resistance enable advantageous results to be obtained in many cases. In addition considerable savings in cost are often possible. Nylon parts, even those of considerable complexity, can be produced simply and rapidly by the injection moulding process commonly used for thermoplastic materials. On a raw material basis nylon is cheaper volume for volume than the more expensive metals such as brass and copper.

Terminology and Chemistry of the Nylons

Nylon is the name, not of a single material, but of a class of synthetic thermoplastic polymers, the polyamides, of which there are at least four types in commercial production throughout the world. The properties of the polyamides vary according to their type and composition but in general all the nylons are characterized by their great strength, toughness and durability, coupled with exceptional corrosion and solvent resistance. In addition they all have high melting points which enable high service temperatures to be withstood under certain conditions.

Nylon was discovered by W. H. Carothers in America in 1928. The method of production was to condense a diamine and a dibasic acid to give a 'salt' and then to polymerize the 'salt' to give a linear, long chain polymer. Since there are many diamines and many dibasic acids which lend themselves to this chemistry, the theoretical number of possible nylon polymers is considerable but in fact only two types are in general production by this method. The first nylon to be developed commercially was made from hexamethylene diamine ($NH_2(CH_2)_6NH_2$) and adipic acid ($COOH(CH_2)_4COOH$) and was called type 66 (six-six) nylon, from the number of carbon atoms in the parent diamine and dibasic acid respectively. Subsequently type 610 (six-ten) nylon was developed from hexamethylene diamine and sebacic acid ($COOH(CH_2)_8COOH$).

A somewhat different method of making nylon polymers—the condensation of certain amino acids was discovered later, and this method of manufacture is now in use in some parts of the world. Types of nylon so made are described by a single number derived from the number of carbon atoms in the amino acid from which they are formed. The two in commercial manufacture are type 6 (six) nylon and type 11 (eleven) nylon, made from ω-amino caproic acid and ω-amino undecanoic acid respectively.

As well as making nylon polymers it is possible to make copolymers by condensing together different nylon salts, or nylon salts and the appropriate amino acids. In addition, any combination of polymers and copolymers can be blended; and polymers, copolymers and blends can all be plasticized to modify their properties. Many different nylon materials can be made available, therefore, with properties varying over quite a wide range.

The properties of the four main nylon types are summarized below:—

TABLE 2

Properties of Nylon Types

Type and Trade Names	Type 66 'Maranyl' A100/M 'Zytel' 101	Type 6 'Akulon' 'Grilon' 'Durethan'	Type 610 'Maranyl' B100/C 'Zytel' 31	Type 11 'Ralsin'
Density, g./cc.	1.14	1.13	1.09	1.04
Melting point, °C.	264	220	220	190
Moisture absorption % at 65% r.h.	3.0	3.5	1.5	0.7
Young's Modulus, lb./sq.in...	4.3×10^5	4.0×10^5	3.0×10^5	2.0×10^5
Tensile strength, lb./sq.in. ..	11,500	10,000	8,500	8,500
Elongation at break, % ..	80–100	150–200	100–150	90–120

The Uses of Nylon

In an initial assessment of the possible use of nylon for a specific application the following factors are worthy of consideration.

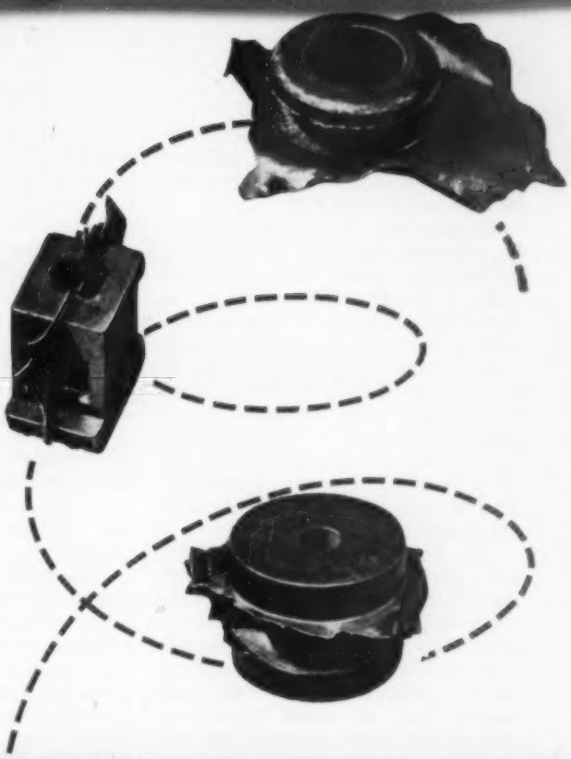
Nylon is a self-lubricating material and can operate successfully under conditions where metals would fail unless lubricated continuously. For certain types of equipment in the textile trade or the food industry this property is particularly advantageous. However it should not be inferred from this that conventional lubricants cannot be used with nylon, in fact where it is possible to use a lubricant, greatly enhanced performance will normally result. Internal lubricants such as graphite and molybdenum disulphide, which can be incorporated in the nylon moulding powder, are

TABLE 1

Comparison of Properties and cost of Type 66 Nylon with those of Metals

Material	Tensile Strength lb./sq.in.	Young's Modulus lb./sq.in.	Density g./c.c.	Melting Point °C.	Coeff. Linear Thermal Expansion °C. × 10^{-5}	Cost d./lb.	Relative Cost per unit vol.
Nylon (dry)	11,500	4.3×10^5	1.14	264	3.1	93	100
Cast Iron	16,000	$14–23 \times 10^6$	7.2	1,100–1,200	.33	2.1	14
Steel (unhardened)	60,000–100,000	$30–36 \times 10^6$	7.8	—	—	—	—
Copper (cast)	19,000	—	8.9	1,080	.50	20	165
Copper (wrought)	34,000	16×10^6	8.9	—	—	—	—
Brass (cast)	18,000	9×10^6	8.6	895	.56	18	145
Phosphor Bronze	58,000	13.5×10^6	8.9	—	—	—	—
Aluminium (cast)	19,000	10.3×10^6	2.7	660	.67	21	54

De-flash small rubber parts with 'DRIKOLD' in the Columbian International Sub-zero Tumbler



Sub-zero tumblers are obtainable from Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4.

De-flash by freezing

When small rubber components are frozen in a rotating drum with 'Drikold'—I.C.I. solid carbon dioxide—flashes become brittle and the tumbling action breaks them off. Sub-zero de-flashing with 'Drikold' can cut costs, speed processes, increase production. I.C.I. Technical Service staff will advise on problems and will de-flash sample batches of components on request.

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similarly effective. If there is no problem of corrosion of adjacent metallic components, then water can be used as the lubricant.

Because of their resilience and lower rigidity compared to the metals, nylon parts exhibit appreciably less noise in service. This property is a significant advantage in such applications as curtain runners, desk drawer rollers, office duplicating machine parts, gears for cameras or projectors, etc. Under some conditions nylon parts may squeak when moving in contact with metals, though this can be eliminated by an external or internal lubricant, such as graphite or aluminium stearate filler.

The low density of the material often results in important weight savings in some applications. Thus conveyor belts made up from moulded nylon slats are very light, and require relatively little power to operate them. Similarly nylon chains are suitable for low-inertia drives. A more recent application has been the use of extruded nylon tube for automobile petrol, greasing and hydraulic pipes.

Nylon is corrosion resistant over a wide range of conditions and can be used in contact with most oils, fuels and organic solvents. Alkalis and weak acids do not attack it, nor is it affected by sea water. It cannot, however, be used in contact with strong acids or strongly oxidizing chemicals such as hydrogen peroxide.

One other property of nylon is worth noting in the initial assessment for a mechanical part. Moving nylon parts are not harmed by dirt and grit in the same way as metal ones. This is because the hard particles are absorbed into the relatively soft resilient surfaces and the components thus continue to function perfectly satisfactorily. This is a particularly useful property for say, bushes which are to be used in dusty environments (for example in mine and quarry equipment).

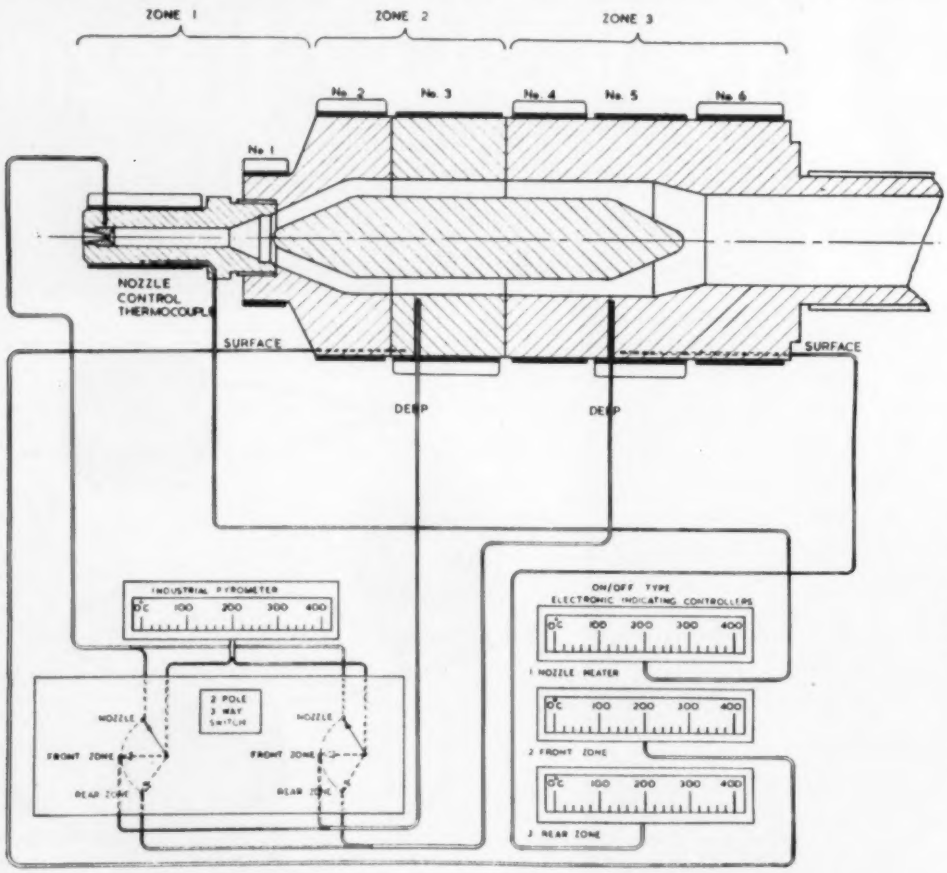
Decorative finishes on a nylon component can be achieved in two ways. Firstly the nylon may be coloured, by incorporating the necessary pigments into the moulding powder, without recourse to relatively expensive finishing treatments such as chromium plating, which is often used with die-cast metal parts. Good examples of the use of nylon finished in this manner are soda syphon tops, refrigerator and washing machine parts and motor car accessories. Coloured domestic water taps, kitchen sink units, and even automobile facia boards have been moulded in nylon. Even more attractive finishes can be obtained by metallizing using the vacuum deposition process. Some of the aerosol-type perfumery dispensers use nylon containers beautifully decorated by this technique.

Fabrication of Nylon

Three main methods are possible.

Machining. It is often convenient to obtain prototypes or small production quantities by machining from extruded rod or tubular bar, which are available commercially in a range of sizes. In general, machining of nylon presents no difficulties and the methods used are similar to those for free cutting brass. Allowance must be made for the lower melting point compared with the metals. Similarly allowance must be made for the relatively greater flexibility in thin sections. It is interesting to note that simple shapes can, if desired, be stamped from extruded strip up to about $\frac{1}{16}$in. (1.6mm.) thick.

Injection Moulding. Standard techniques for the injection moulding process can be applied for nylon. Because however of the characteristic sharp melting point of the nylons, coupled with low melt viscosity and



Plasticizing chamber and nozzle for nylon moulding with arrangements of heaters and thermocouples

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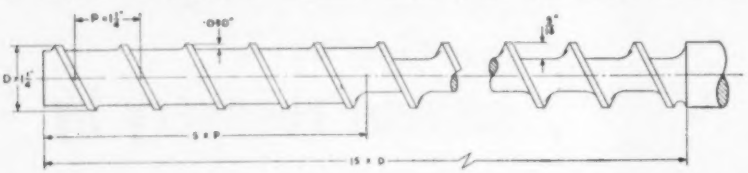
limited moulding temperature range, it is often necessary for one or two extra precautions to be observed. For example because of the low melt viscosity the nozzle design on the heating cylinder may require modification to prevent dribbling which may otherwise occur with a standard nozzle in between injection periods. Several types of nozzle design have been developed incorporating ingenious types of shut-off valve but perhaps the simplest and certainly the most effective is the 'thermoseal' type developed by Griffiths and Munns[1]. In this design use is made of the characteristic sharp melting point of the nylon to prevent dribbling and since the nozzle embodies no moving parts extreme reliability can be expected.

A further precaution, which is a very desirable feature with all injection moulding, is good temperature control. Most of the new injection moulding machines now embody a reasonable standard of temperature control. With some of the older machines it may prove advisable to improve this feature by fitting more advanced controllers and relocating the control thermocouples in slots underneath the heater bands. This procedure is described by Griffiths and Munns[2].

Extrusion. This technique is confined to the continuous production of tube, strip or rod. Again the principles are similar to those employed for the extrusion of other plastics. Again because of the sharp melting point and low melt viscosity a special design of extrusion screw is preferred. Shallow single-start screws of 15/1 length/diameter ratio with compression of about 3.5/1 should be used. The compression may be achieved by varying the depth at constant pitch. Screw clearance should not exceed .002 (0.05mm.) and coring for water is not required. Good temperature control on the extrusion barrel is essential and it is desirable to have three or perhaps four heating zones with suitable control.



For extrusion of nylon tube, strip or rod, shallow start screws of 15: 1 length/diameter ratio should be used

Design Problems with Nylon Parts

Although nylon has the advantages discussed earlier, it is different from the metals in several important respects, and it is therefore imperative that the design engineer should be familiar with these differences.

Firstly when using nylon as an engineering material particular attention should be given to its property of absorbing moisture from the atmosphere. Thus a dry, freshly moulded component will on storage pick up water slowly until an equilibrium condition is attained. Fig. 1 illustrates this effect for a $\frac{1}{8}$in. (3.2mm.) thick moulding exposed to an atmosphere of 65% relative humidity. It will be noted that the water content continues to rise slowly over a period of about $1\frac{1}{2}$ years until an equilibrium water content of about 3% is attained. This equilibrium concentration is dependent solely on humidity and is substantially independent of temperature and thickness of the moulding, though these variables will of course, influence considerably the rate at which the moisture is absorbed.

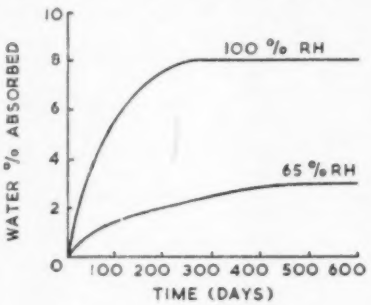


Fig. 1. Water absorption

The second point to be noted is that it is not possible to maintain such a high degree of accuracy of dimensions when manufacturing nylon parts by injection moulding as it is when machining or indeed die-casting metal parts. This arises from the practical difficulty of controlling the relatively high shrinkage (of the order of 2%) which occurs during solidification and cooling in the mould. Much can be achieved by careful control of injection machine variables but general experience indicates that limits tighter than ±0.2% are impracticable in most instances. It should be appreciated, however, that nylon components can accommodate dimensional inaccuracies which would be quite unacceptable with metals. Control of dimensions of nylon parts is also complicated by the absorption of water from the atmosphere since this causes swelling. From Fig. 2, which relates the linear dimensional change with water content, it will be noted that within the range 0-5% absorbed of water, a change of 1% water content produces a change in linear dimension of roughly .2%. Providing therefore the average humidity to be expected is known, and is not subject to wide variations, the dimensional changes can be reduced to negligible proportions by pre-treating the parts in water, or 'normalizing' as the procedure is often called.

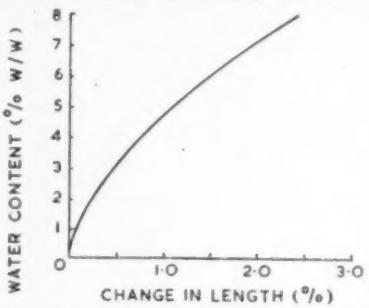


Fig. 2. Variation of length with water content

Coefficients of friction are difficult to quote since friction is specific to the particular conditions involved. Thus for example the applied load, the speed of slip, and the conditions of the nylon surface (machined or moulded) all have an important influence on the result obtained. Therefore the data, given in Tables 3 and 4, which were obtained under the specific conditions indicated should be taken as a guide only.

TABLE 3

Kinetic coefficient of friction of Type 66 Nylon

Moving Surface	Stationary Surface: Nylon (moulded)	Nylon (machined surface)	Mild Steel
Nylon (moulded)	0.63	0.52	0.31
Nylon (machined surface)	0.45	0.46	0.33
Mild Steel	0.41	0.41	0.6–1.0

TABLE 4

Effect of lubricants on kinetic coefficient of friction of Type 66 Nylon (like surfaces)

Lubricant	Coefficient of Friction
None	0.46
Water	0.24
Liquid paraffin	0.13
Graphite	0.28

The figures quoted in Tables 3 and 4 were determined on an apparatus consisting essentially of a loaded hemispherically-ended slider held in contact with a moving plate. The speed of slip was 1 cm./sec. and the applied load 2 kg.

Continued on page 142

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VIEWS and REVIEWS

W. B. Wiegand

MANY readers will have noted that W. B. Wiegand was named at the recent International meeting, sponsored by the Division of Rubber Chemistry of the American Chemical Society to receive the Charles Goodyear Medal for 1960 in recognition of his important contributions in the field of carbon black. Few, however, will have observed that thereby he becomes one of a select band, I might say, a very select band, of those named to receive

This picture, first reproduced in RJIP June 22 1957, shows W. B. Wiegand receiving, in Montreal, the Colwyn Medal from Dr G. Stafford Whitby who was himself the first recipient of the Medal. It was, incidentally, the first, and so far only, occasion on which the Colwyn Medal has been actually handed over outside Great Britain

the highest honour that both the USA and the UK—by virtue of the Institution of the Rubber Industry's Colwyn (Gold Medal)—have it in their power to bestow. As readers may remember it was only a very short time ago that I was able to make this latter announcement, and to give some particulars of the recipient in the UK, an honour that Professor Whitby took upon himself, as the first recipient of the Colwyn Medal, to hand to Wiegand in 1957. It is for this reason alone that, in the present occasion, I give no further account of Wiegand's doings in the realm of carbon black.

Society of Chemical Industry

The following notice appeared in *Chemistry and Industry* of December 19 1959, p. 1599, with the title and sub-title as follows:

'Plastics and Polymer Group Symposium: London, Sept. 21-23 1960.'

'High Temperature Resistance and Thermal Degradation of Polymers.'

'In view of the number of contributions which already have been promised it has been decided that the above Symposium will be extended from two to three days, and will take place on September 21, 22 and 23 1960, instead of on September 22 and 23 1960, as previously announced in *Chemistry and Industry*, 1959, p. 582.'

(Note: The importance of the Symposium may be judged by the fact that the names of contributors—except for the above announcement and the note as to further information—fill a complete page of our contemporary, in small print.)

Polythene or Polyethylene

'At a meeting of the Council of the British Plastics Federation on November 18 the usage of the terms "polythene" and "polyethylene" was discussed and as a result the following terms were resolved:

(1) 'It was agreed to recommend to BSI that the term "polythene" and "polyethylene" should be shown as of equal status.

(2) 'It was agreed to recommend to BSI that in all future British Standards the term "polythene" should be used, but on the first occasion of its use in any British Standard or similar document a footnote should be inserted to the effect that "polyethylene" is an equivalent term.'

SP Rubber in Japan

In 1958, the RRI of Malaya sent samples of SP rubbers to the Foundation of Rubber Research and Development in Tokyo. These were brought to the attention of the 36th Sub-Committee of the Rubber Engineers' Association of Japan who agreed to carry out tests, the work being carried out by ten manufacturers.

This announcement has been made in the Winter Issue of *Rubber Developments* (Vol. 12, No. 4, p. 122), who also report that the conclusions reached are as follows:

Tests in which SP Rubbers are Superior to Normal Rubber

1. The raw Mooney Viscosity of SP rubber is higher than that of normal rubber. In effect this means that SP rubber has greater initial stiffness and retains its stiffness longer when subjected to prolonged milling.
2. SP shows less shrinkage and has a better finish when milled to thin sheets.
3. SP rubber can be more rapidly extruded; it swells less after extrusion and has better surface finish.
4. Compounds unsupported during cure show less sag.
5. Expansion after cure is less.

The above advantages are conspicuous in pure mixes. The advantages are less pronounced when large amounts of compounding ingredients are used. Trial products, including baseballs and rice planters' socks, showed conspicuous advantage when made with SP rubber.

Tests Showing Little Difference

In the following tests there was little difference between SP and normal rubber:

Mixing; Tack (slightly less adhesive, but not sufficient to make practical difference).

Tensiles are slightly higher in SP, especially Modulus

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

and Hardness, but EB slightly lower. Resistance to abrasion unchanged. Electrical properties are much the same.

Concrete Evidence of Value

This comprehensive series of tests, undertaken by an independent body of rubber users, is concrete evidence that SP rubbers are of considerable value to manufacturers. Most of the disadvantages listed can be overcome, without losing any of the advantages, by judicious compounding. Japan's use of SP rubber reflects the wide general interest. Current world consumption has reached the 3,000 tons per year level. In the second quarter of 1959, Japan was fifth in the world list of importers of SP rubber.

(*Note:* A report upon these tests was published in Japanese in 1958, and the Foundation for Natural Rubber Research in Japan has kindly provided an English translation on which the above is based.

The Reaction of Ozone with SBR Rubbers

The subject in the heading to this note was reprinted from the 'Symposium on the Effect of Ozone on Rubber' by *Rubber Chemistry and Technology's* latest issue (No. 4, Vol. xxxii, 1959, 1,062 to 1,079). It is by E. R. Erickson, R. A. Bernstsen, E. L. Hill and P. Kusy (Augusta Research Foundation, Rock Island, Ill.). This is a Special Technical Publication of the ASTM, No. 229, 11 to 29, September 1958.

Synopsis

'All styrene-butadiene, when tested in a relaxed state, reacted with ozone (25 to 500 pphm (parts per hundred million) ozone in air) to form an oxidized film which provided an effective barrier against attack.'

SBR vulcanizates that were under stress, but which contained no effective antiozonant, were readily attacked. The absorption of ozone began with an initial rate of zero, but rapidly increased until a maximum rate was reached, when ozone cracks became visible.

SBR vulcanizates that were under stress but contained an antiozonant absorbed ozone with a high initial rate which depended on the concentration of the ozone-sensitive materials on the surface of the vulcanizate and on the partial pressure of the gaseous ozone. The rate of absorption declined during exposure until a steady low equilibrium rate was reached. The vulcanizates were protected from an attack (by ozone cracking) to a degree which ranged from poor to excellent, and depended (a) on the differential in the rates of reaction of ozone with the antiozonant and the rubber hydrocarbon, (b) on the initial concentration of the antiozonant at the surface of the vulcanizate, and (c) on the rate of effusion of fresh antiozonant from within the surface of the rubber to the outer surface of the oxidized barrier.

A mechanism is proposed for the protective action of antiozonants, and a rate equation has been derived from this mechanism which is consistent with the experimental data.

Note

The following note is based on reports in *Kautschuk u. Gummi* (*WT.* 320 *to* 326). *Series: Vulcanization of High-Elastic Polymers; No.* 29, 'Influence of Fillers on the course of Vulcanization Reactions (II),' by *Gunter Mau, Walter Scheele and Georg Kemme* (*Kautschuk u. Gummi, Vol.* 12, *No.* 11, *W.T.* 320):

'The influence of Aerosil on the kinetics of thiuram vulcanizate was investigated in detail. The specific rate constant of thiuram decrease, dithiocarbamate formation and cross-linking reaction show a linear increase with Aerosil content of the rubber mixture. It is shown that thiuram vulcanization in the presence of Aerosil is heterogene catalytic and that especially the observed rate constant only depends on the surface area of the silica. There is no increase of vulcanization degree by Aerosil according to a constant limiting value of reciprocal swelling.' The catalytic activity of Aerosil on thiuram vulcanization as described is subsequently disturbed by increased glycol content.

PHILIP SCHIDROWITZ

Common Market Rubber Industry

POLICY AND PROBLEMS

THE Liaison Bureau of the European Economic Community's Rubber Industries in which the rubber industry's associations of Belgium, France, Italy, West Germany and Holland are represented, says in a report that it is presently dealing with the correct application of the articles of the European Common Treaty which regulate the gradual elimination of quotas of which, in the production of rubber goods, there remain only vestiges in France.

With regard to a common trade policy, the Bureau has had occasion to accomplish a first official step within the European Community at the end of 1959 by asking for the intervention of the Community with the Benelux Governments so that the latter may revoke the liberalization measure for the import of rubber footwear and rubber mattresses from East European countries. Proposals have already been sent to the associated footwear manufacturing firms to resolve problems associated with the competition from Hong Kong footwear imports and imports of footwear from other Asian and East European countries.

Israeli Synthetic Rubber

The project to establish a synthetic rubber plant near the Haifa oil refineries is still under consideration, according to Israeli Government sources. The plant, which is to produce 15,000 tons of synthetic rubber a year, will require an investment of about $12m. A group of American investors have already expressed readiness to invest $4m. in the project.

The planned output is based on a consumption of 8,000 to 10,000 tons of synthetic rubber by the local tyre industry. Today, the two tyre plants process only 5,000 tons of rubber a year, but with the completion of the current expansion programmes demand for synthetic rubber will reach the envisaged level.

Questions Corner—101

(Second Series)

423. Give some information relating to polythene extrusion by the profile and pipe extrusion methods.

424. Give some of the properties of polyvinyl butyral.

425. What types of machines are used for mixing thermoplastics?

426. Give some details of the uses of polyacrylonitrile as a flatting agent.

(Answers next week)

Answers to Questions Corner—100

419. Polyacrylonitrile does not dissolve in the conventional solvents and development was towards a copolymer which would be soluble in, *e.g.*, acetone. One of the first materials to be investigated was vinyl chloride.

In the form of staple fibres, vinyl chloride-acrylonitrile copolymer is characterized by good strength, resilience, warmth, is easily dyed, and resists combustion. It is moth-proof, non-shrink, and resists solvents, acids and alkalis.

Later developments discovered a series of solvents suitable for spinning polyacrylonitrile and either wet or dry spinning processes may be used, and continuous filament or staple fibres produced. (USP 2404714 to 2404725.)

Polyacrylonitrile fibres have outstanding resistance to sunlight and weathering, chemicals, moths, heat and bacteria. They are also dimensionally stable to dry and wet cleaning, rapid drying, low-moisture absorption, good electrical properties, ability to be set by heat and with a warm feel.

These fibres have been suggested as suitable for the production of smooth and pile fabrics, upholstery fabrics, velvet, tropical clothing, protective clothing, rainwear, tarpaulins, filters, etc.

420. The design of the nozzle in injection moulding machines is important in its relation to temperature and pressure. It is essential to avoid unnecessary resistance to flow, and to maintain a uniform temperature at the nozzle, in the sense that it is desirable to avoid chilling the material after heating in the cylinder. The use of a nozzle with a long taper will give resistance to flow which is more than necessary.

Reversed taper nozzles have been found to be useful in moulding crystalline materials, *e.g.*, nylon, which have relatively high, and sharp, melting points. These materials may drool from the nozzle if it is too hot, or may even 'freeze' if too much heat is lost to the sprue bushing. The reversed taper nozzle makes it easy to extract chilled material from the nozzle.

Nozzles extended to the cavity improve cycle time and reduce weight of shot because they virtually eliminate the sprue. This type of nozzle is ideal for automatic moulding because sprue trimming is not necessary.

421. Tri-tolyl phosphate (Tricresyl phosphate) is manufactured from a mixture of cresols consisting mainly of the meta- and para-isomers and contains an average of 3% to 5% and a maximum of 8% ortho-cresol. It consists mainly of mixed esters.

Tri-tolyl phosphate is a clear viscous liquid, odourless and miscible with most organic solvents, including alcohols, esters, ketones, aliphatic and aromatic hydrocarbons, mineral and vegetable oils.

It is compatible with a large number of resins, including alkyds, vinyl polymers, polyvinyl acetals, phenolics, etc., but has a limited compatibility with cellulose acetate, cellulose acetate butyrate, polymethyl methacrylate and polyvinyl acetate.

TTP is very stable and has a very low solubility in water which results in good moisture resistant characteristics. It has a very low volatility, good flame resistance, and is useful for the preparation of abrasion-resistant compounds.

TTP is one of the important plasticizers for use with polyvinyl chloride, and copolymers, and is used extensively in paste formulations. In addition to its low volatility it is retained in compositions extremely well and, of course, its non-inflammability is important. TTP also resists fungus attack, but should not be used alone if low temperature flexibility is required. A proportion of the TTP should be replaced by one of the phthalates or ricinoleate. Its use is of value in conveyor belting used for coal mines.

Evidence as to the toxicity of TTP has indicated that its toxic properties are related to the proportion of ortho-cresol present in the cresol mixture from which the product is prepared, and today this is kept very low. Where normal industrial precautions are taken there has been no well-authenticated case of trouble arising through ingestion, inhalation or absorption through the skin. It should not be used for food wrapping or for materials which are in prolonged contact with the skin.

422. Metal lacquers: These are applied as a very thin film in order to protect the metal surface from oxidizing, *e.g.*, polished silver or brass. The solvents used must be chemically inert to avoid staining of the metal, *e.g.*, butyl or amyl acetate, butyl alcohol. The nitrocellulose should be of the high nitrogen type and at a concentration of about 6%. Plasticizers are only used in very small amounts, and the addition of resins is unnecessary. Transparent lacquers are used, but they may be coloured with soluble dyestuffs for special applications.

Metal enamels: Where metal is to be protected with several coats of lacquer, *e.g.*, motor cars, a low viscosity nitrocellulose is used. They are dissolved in similar solvents to those mentioned above, but with the addition of a readily volatile one, *e.g.*, ethyl acetate. Plasticizers such as tricresyl phosphate and dibutyl phthalate may be used.

Wood lacquers: For many years nitrocellulose lacquers have been used for wood furniture. Nitrocellulose solutions are used for priming because they dry quickly and close up the pores of the wood. Matt polishes, on a cellulose base, are popular as they are unaffected by water. This resistance to moisture is also of advantage in the making of musical instruments, for coating interior wooden parts, and the swelling and shrinkage of the wood, with varying humidity, is prevented.

Brushing lacquers: These lacquers require the use of low viscosity nitrocottons, particularly those of high alcohol solubility, with slow drying solvents.

Leather lacquers: Solutions of nitrocellulose are used in the leather trade for various purposes, *e.g.*, for fixing aniline-dyed grain, for dressing splits and for the production of japanned leathers. Nitrocellulose of a high nitrogen content for fixing, and for japanned, or patent leather, low viscosity is suggested. Leather lacquers must have good adhesion and not liable to peel off. Suitable plasticizers are tricresyl phosphate or dibutyl phthalate, mixed with castor oil, which do not sweat out.

(More questions next week)

Polly Ester Says . . .

'Adhesive Technologist — That clinging type in the Composition Department'

MEN *and* MATTERS

A Review of People and Events

by George A. Greenwood

THERE was reference in adjoining columns last week to the celebration of the fiftieth year which has marked a significant point in the history of this noted company. What has interested me in this connexion has been the fashion in which the chairman and directors have chosen to mark the occasion, and to salute the company's 30 years' association with the Borough of Burton-on-Trent.

A few days ago at an interesting ceremony in that North Midlands town, the Pirelli chairman, the Rt. Hon. G. E. P. (Peter) Thorneycroft, M.P., a one-time distinguished President of the Board of Trade, on behalf of his colleagues, presented the town with an excellent means of improving the facilities for technical education in the area. In short, Mr Thorneycroft handed over to the Mayor (Alderman F. G. Peach), a micro-film reading unit for installation in the Borough Library, together with a cheque for £1,500 which is to be used to establish a Pirelli Trust Fund. The income from this will enable the Library to buy every year a quantity of the latest technical books and it will, of course, be available in perpetuity.

The Rt. Hon. Peter Thorneycroft, M.P. (*left*), **chairman of Pirelli Ltd., discusses with the Mayor of Burton-on-Trent the Ross micro-reader which has just been presented by Pirelli together with a cheque for £1,500**

The micro-reader is the latest development in the field of micro-recorded text books and records, and in view of the history of the Pirelli Company in the course of this past 50 years in the development of science as applied to rubber, what could possibly be more suitable? I am told that this is the first micro-reader to become available to the public of the Midlands, and it will enable those students who are not attached to a University to investigate at first hand the wealth of technical information which is recorded on micro-film in Universities and scientific centres throughout the country.

Industry and Science

I was not, I fear, present at the Town Hall when my old friend Peter Thorneycroft handed over the gift, but from information supplied to me he made it quite clear in the course of his speech where his company stands in this matter of harnessing industry to science. A particularly interesting point he made is that in May 1929 the first tyre came off the production line at Burton in a factory employing about 350 people. Today—30 years later—something like 1,500 people are at work in the factory which, as most of us know, has now added rubber-soled footwear and resilient webbing to tyre production. This latter development is of great importance because of what it is doing in the making of seats of vehicles of all types and in furniture.

There is one other point I might make, and it is this. In a way, at Burton-on-Trent, Peter Thorneycroft was upon his own ground, for he is a Staffordshire man by long descent, and his forebears played a prominent part in the county's industrial and commercial development.

Pops by Plastics

There's an old saying that wonders never cease. Another is that you never hear the latest, but I have been intrigued by what is happening in the making of musical records especially the long-playing variety by the Gala people. As a matter of fact, these are made and produced by Musical and Plastic Industries, run by two brothers whose names, Ben and Lew Davies, in the Tin Pan Alley area of Charing Cross Road, are now something of a phenomenon.

I am concerned here not with the technique of production of these records but with the difficulties which these makers have had to face up to in their distribution and sales. For some reason or other, which I gather is largely a matter of the reduced price factor, the established British wholesalers, so I understand, refuse to distribute the Gala product. I have been told that some of the Trade Press were somewhat offhand about accepting the company's advertising.

I am glad to be able to add that rather than be bested by these antics, Musical and Plastic assure me that they have found methods of distributing through all sorts of outlets which normally have nothing to do either with records or with plastics —such as radio dealers, book wholesalers, the big general stores, and so on. It seems, all the same, remarkable that 'M. and P.' are able to put on the market and sell a long-playing 12in. record, with colour photography on the sleeve, for 16s. 9d.

Toy Market

And here, again, on the somewhat lighter side, is an interesting note on what happened at the International Toy Fair at Harrogate which has just closed. From two or three correspondents I have been hearing that buyers and visitors from abroad have been amazed at the standards exhibited,

especially in plastics. For some time now I have been recording the odd and many-sided ways in which plastics are being employed to produce articles both of utility and decoration in their infinite variety and capacity.

For the record, let me add that one of the big North American 'noises,' Mr Harvey Schleider of Montreal, says that the plastic toys at Harrogate were as modern as anything to be seen in the stores of New York City. I fancy some others would add that that could well be an understatement!

North British Appointments

North British Rubber have announced the appointment of two new

P. HANDFORD R. CLUNIE

regional managers for its Footwear Sales Division. Mr P. G. Handford takes over the Southern area, based on London. The Midland region comes under Mr R. M. Clunie, operating from Manchester.

Politics in Industry

It would not, I hope, be possible for anybody who has been reading these columns of mine in the past two or three years to declare positively where my politics lie. In my view, and by and large, party politics ought not to be insinuated into industry, but other people appear to think otherwise. For example, the Free Trade Union, which is almost entirely a party organization of a complexion which you will easily recognize, is to make an official application to the Board of Trade for 'cheaper tyres for Britain's 1,750,000 road vehicles.'

Mr Richard Lamb, the chairman, has, if I am not much mistaken, a distinguished family record within the Liberal Party to his credit, which will probably account for his Free Trade Union activities, but how easy it is to let one's enthusiasm run away with realities! Mr Lamb, backed by his supporters, says he is going to ask for the removal of the 30% import duty which benefits only the few tyre manufacturers in the United Kingdom, and he says that this could mean saving the public £24,000,000 a year!

I.C.I. Appointment

Maurice A. E. Hodgson, who takes up his appointment as Development Director of I.C.I.'s Heavy Organic Chemicals Division on February 1 1960, was born at Bradford, Yorkshire, in 1919. Educated at Bradford Grammar School and Merton College, Oxford, he joined the Billingham Division Research Department in 1942, becoming its section manager in 1948. In 1953 he was transferred to the Gas and Power Works at Billingham.

From 1955 to 1958 Mr Hodgson was with I.C.I. (New York) Ltd., returning to this country to become head of I.C.I.'s Technical Department at Millbank.

Acetal Resin Prices

A reduction of seven cents a lb. in the price of Delrin acetal resin has been announced by E. I. du Pont de Nemours and Company Incorporated. The new price is 88 cents a lb. in quantities, down from 95 cents a lb.

Mr J. I. Taubman has been elected chairman, and Mr Edward Taubman appointed a director, of the Java Para Rubber Estates. Mr Sebag Cohen, Mr L. Grahame and Mr S. I. Alman have resigned from the Board.

I.C.I. Polypropylene Plant

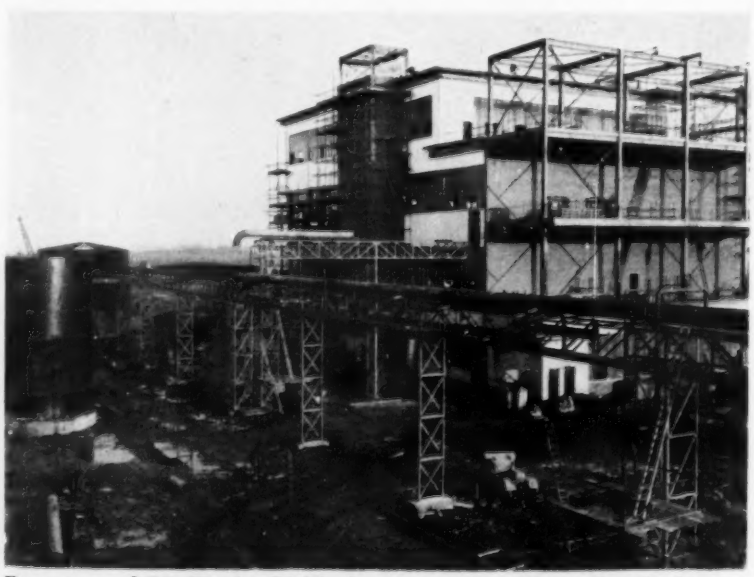
ON STREAM THIS YEAR

RAPID progress made during 1959 on the erection of I.C.I.'s polypropylene ('Propathene') plant at Wilton, Yorkshire, indicates that this 10,000-ton-capacity plant will be on stream towards the end of this year; well ahead of schedule.

The Propathene plant—the buildings are completed ready for processing equipment to be installed — is being built so as to allow for rapid expansion.

Alongside the plant for the synthesis of Propathene the Plastics Division will produce organo-aluminium compounds in bulk for use as catalysts in the process. The production of these complex chemicals presents a number of technical difficulties but the I.C.I. chemical engineers responsible for the development report excellent progress.

I.C.I. first announced plans to extend its polyolefine activities in April this year, following the signing of an agreement whereby I.C.I. acquired a licence under the Montecatini and Montecatini/Ziegler UK patents covering the production and use of this new plastic material, originally discovered by Professor Natta.



Progress on I.C.I. Plastics Division's polypropylene ('Propathene') plant at Wilton is well ahead of schedule. The plant will be on stream this year instead of next

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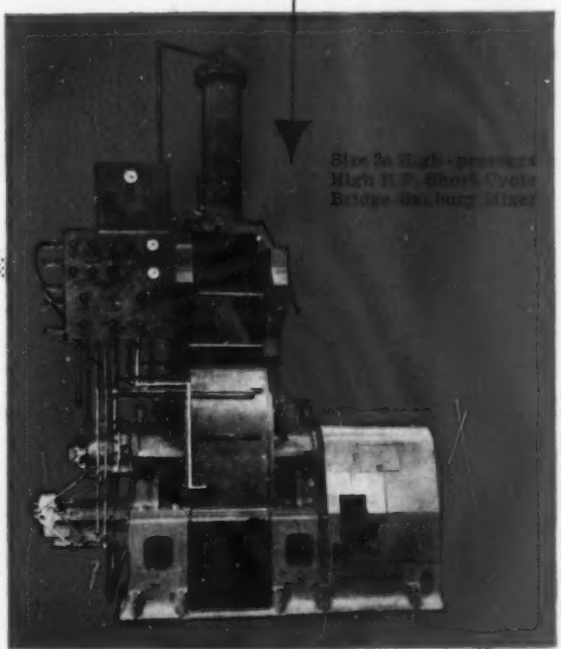

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Plastics Institute

LONDON SECTION DINNER

THE annual dinner and dance of the London and District Section of the Plastics Institute was held at the Criterion, Piccadilly, London, on January 14. Members and their guests were received by the chairman of the London section, Dr J. Gadsby and Mrs Gadsby. The attendance, just over 400, made this by a long way the largest social function ever held by the section.

More Than Ever

The increase in numbers, while emphasizing the popularity of the occasion, did not detract in any way from the atmosphere of friendly informality which has always characterized it. The increase in space, made available by the move to more and larger rooms in the building made familiar on previous occasions, allowed members to spread themselves. There was, however, an exception to this during the run of the highly successful Tombola, operated by a tireless team led by W. J. Marmion, London Section Committee member, who had himself put in a tremendous amount of work, not least in arranging transport of the more than 400 prizes. Such was the enthusiasm for this event that more people were compressed, and very happily compressed, into less space than had probably previously been thought possible. Observers from London Transport, had there been any present, would have obtained some valuable tips for 'packing 'em in' even more in the rush hour. There was a difference, of course. There are no prizes for rush-hour travellers. London section members and guests carried off a vast number of trophies ranging from bottles of 'the right stuff' to polythene wash bowls.

Traditionally Informal

In a short speech of welcome, Dr Gadsby said he wanted especially to welcome the ladies who were, in fact, their principal guests. The London section dinner dance was traditionally informal, he said, and therefore it would not be appropriate to introduce the many important guests they had with them. He would like to say, however, how pleasant it was to welcome their president, Mr H. F. Wilson, and Mrs Wilson, and also those who turned up regularly year after year. Thanks were due, too, to those who had contributed to the Tombola, and to those, including Charles Oakhill, who had worked so hard on the arrangements for the evening.

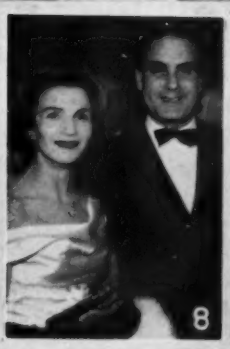
£750,000 Commercial Plastics 6% debenture stock, 1980-85, has been placed privately at par. The proceeds will be used to finance expansion of the company's business. No Stock Exchange quotation is being sought.

The offer made on behalf of the Dare Group has been accepted by the holders of 90% of the capital of Shockstop Rubber Products and has become unconditional.

Among those present at the annual dinner and dance of the London Section of the Plastics Institute were (*facing page, left to right*): **1. Dr F. P. Hiron, vice-chairman, and Mrs Hiron, Dr J. Gadsby, chairman, and Mrs Gadsby, Mrs Oakhill and Mr Charles Oakhill, secretary. 2. Mr and Mrs L. W. Rodway, Mr and Mrs L. G. Stannery, 3. Mr V. H. Wentworth** (*on right*), **Mrs Wentworth, Miss Wentworth and friend. 4. Mr David Radford and Mr Norman Punfield. 5. Mr C. E. Toft and Mr B. S. Freeland. 6. Mr J. V. Crossley and Mr Everson Davis. 7. Mr and Mrs J. Fergus, Mr and Mrs L. G. Sliney. 8. Mrs Rohan, Dr G. A. Rohan. 9. Mr and Mrs C. E. Toft, Mr and Mrs Percy Smith**

More pictures from the PI Dance

At the Plastics Institute London Section Dance



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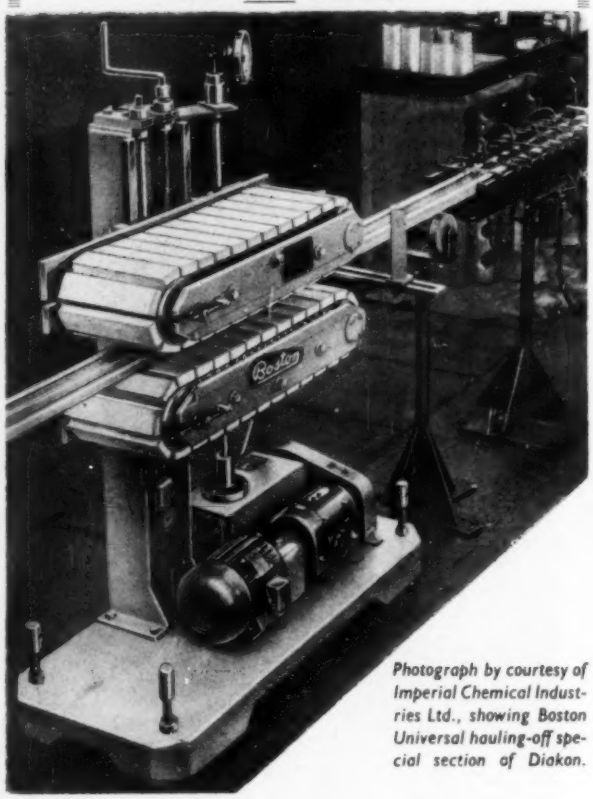

Photograph by courtesy of Imperial Chemical Industries Ltd., showing Boston Universal hauling-off special section of Diakon.

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RABRM at PS Exhibition

TESTING INSTRUMENTS

A NUMBER of instruments which have been developed by the Research Association of British Rubber Manufacturers were shown at the 44th Physical Society Exhibition, held at the Royal Horticultural Society's Old and New Halls from January 18 to January 22.

On display was the RABRM electronic tensile tester which has been designed to carry out and record tensile stress-strain measurements on a wide variety of materials at temperatures from −50°C. to 250°C. It employs the combination of proof ring and transducer to measure the applied load with automatically selected load ranges, followed by electrical conversion of load to stress in desired units on adjustment of controls for the initial cross-sectional area of the sample. A simple mechanical/electrical device automatically measures and records the strain. The machine is equipped to test at four selected rates of grip separation. Fig. 1 *left*, illustrates the electronic tensile tester with the temperature-controlled cylinder for encasing the sample.

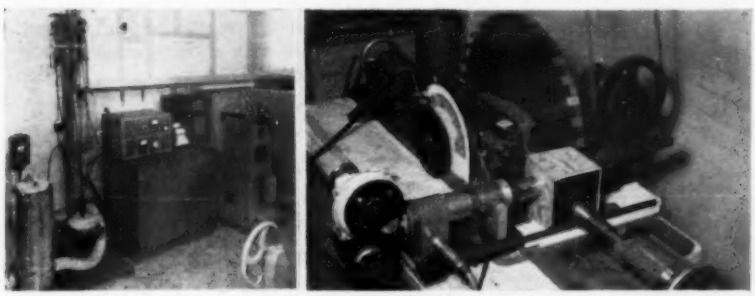

Fig. 1 (*left*). **The electronic tensile tester, designed to carry out and record tensile stress/strain measurements on a wide variety of materials at temperatures from −50°C. to 250°C.** *Right*. **The sinusoidal strain dynamic tester**

Dynamic Tester

The RABRM sinusoidal strain dynamic tester has been designed to cover a wide range of operating conditions, in order that the full-size or scaled-down versions of complex anti-vibration or shock absorber units can be tested under the conditions actually met with in service. The measuring technique relies on the differential displacement transformer and proof ring to measure the forces involved. The frequency range is from 0.001 to 50c/s at a strain amplitude which can vary from 0.001 to 0.5in. A temperature range of −70°C. to 200°C. can be covered. Facilities for prestressing the rubber are incorporated. As it was not possible to install the machine at the exhibition a scale model was shown, but the full machine is illustrated. (Fig. 1 *right*.)

The RABRM friction apparatus measures the variation with load of the coefficient of friction of various polymers when sliding against a flat plate of the desired material at a constant velocity. It has been used in investigating the friction of PVC against steel. A flat ground steel plate is pulled by a geared induction motor under a loaded polymer sample which is held by a system of springs. The friction force is proportional to the displacement of a double cantilever spring, and is measured by means of a differential transformer. (Fig. 2 *right*).

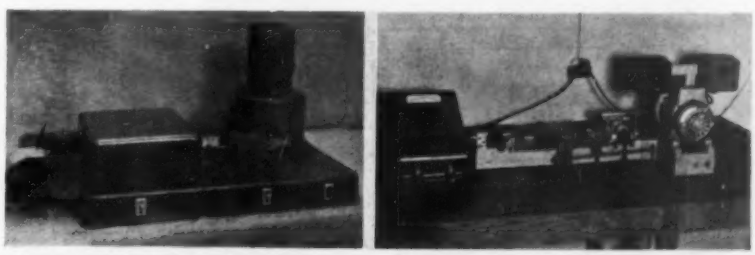

Fig. 2 (*left*). **The Shawbury curometer.** *Right*. **The RABRM friction apparatus which measures the variation with load of the coefficient of friction of various polymers when sliding against a flat plate of the desired material at a constant velocity**

The RABRM rope friction machine (Fig. 3 *left*) measures the frictional forces developed by the passage of a rope or belt over the surface of a sheet of rubber or other material. It has been used at the RABRM in connexion with studies of the wear behaviour of proofed covers which are secured by rope binding. The strip of material is secured to a small diameter cylindrical mounting which rotates against a spring. Rotation of the mounting is magnified mechanically before measurement with a differential displacement pick up. The rope, under the action of a constant weight, is dragged across the sample for a pre-arranged small interval of time. Values of the friction coefficient can then be determined.

Polymer Degradation

The RABRM intermittent stress relaxation apparatus is illustrated (Fig. 3 *right*). It is convenient for an interpretation of the underlying processes in polymer degradation to measure the tension intermittently, at a constant elongation of a strip of rubber undergoing ageing in an unstretched state. This apparatus utilizes once again the differential displacement transformer and proof ring for this purpose. The rubber strip is enclosed in a vessel which can be evacuated or contains a controlled atmosphere and is immersed in a thermostat bath at a controlled temperature.

The Shawbury curometer (Fig. 2 *left*), the only one of this group of instruments which does not depend upon the use of the differential transformer displacement pick up, has been designed to assist the rubber technologist in the routine evaluation of the curing characteristics of rubber but has obvious extensions

to any system in which flow or elasticity is changing. The instrument that was on show was an early experimental model but it is available commercially. (A full illustrated description of this instrument was given in *RJIP*, June 6 1959). Curing or vulcanization characteristics are followed by recording the change in dynamic modulus or stiffness at low frequency and low amplitude. A simplified diagram (Fig. 4) of the experimental model shows the principle of operation. A shearing stress is applied to the rubber sample by means of leaf springs. Two outer pairs of leaf springs carry the block A which is oscillated by an eccentric. A third pair of leaf springs, B, are fastened to the block A and also to the arm which transmits the shear to the rubber through a metal paddle embedded in it. The rubber sample

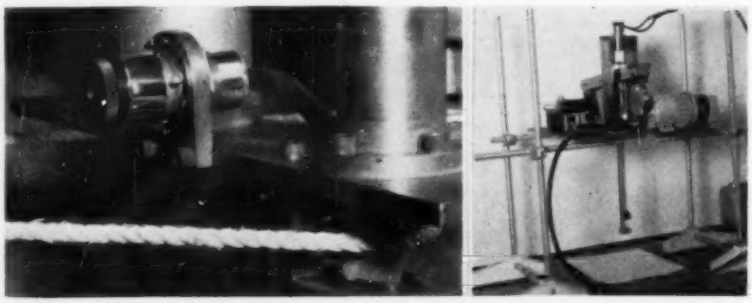

Fig. 3 (*left*). **The rope friction machine which measures the frictional forces developed by the passage of a rope or belt over the surface of a sheet of rubber or other material.** *Right*. **The RABRM intermittent stress relaxation apparatus**

A typical trace obtained from the instrument is illustrated (Fig. 5). The first part shows the initial flow which occurs when the rubber is placed between the hot platens. The second part of the trace shows the beginning of cure, and this continues until the two lines are at the minimum distance apart, which corresponds with the optimum value for the dynamic modulus. Under conditions where reversion occurs, the distance between the two lines will then increase as the dynamic modulus decreases. The curometer thus enables a continuous record to be made of the vulcanization of the compound whilst cure is taking place. This takes no more time than that required for the vulcanization itself, and uses only a very small quantity of material. Moreover, the production model of the apparatus is a straightforward mechanical device which can easily be maintained. Several machines can be operated by one man, as no attention is needed during the progress of the vulcanization reaction causing change in physical properties.

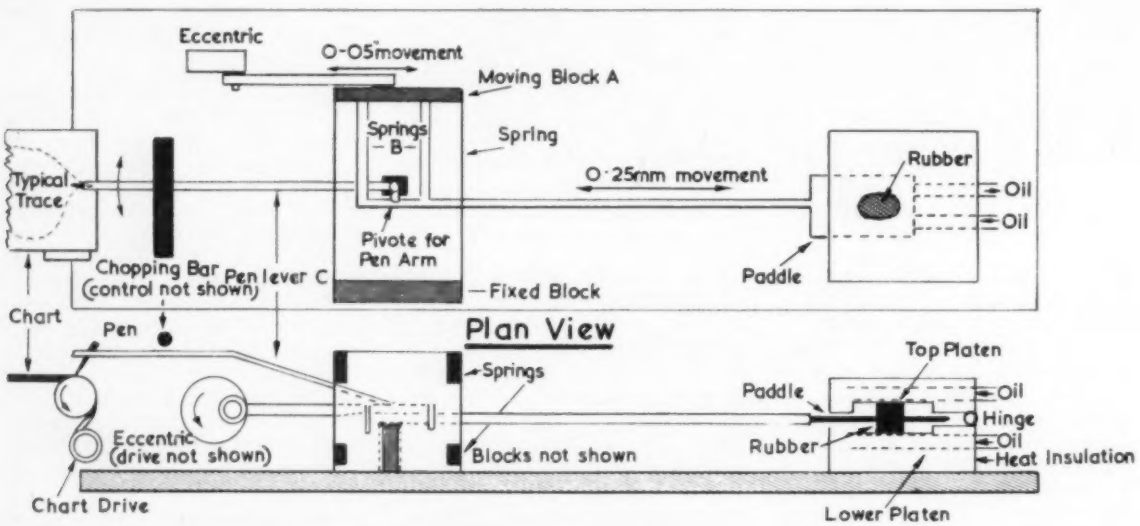

Fig. 4. A simplified diagram of an experimental model of the Shawbury curometer

is heated by contact with the platens, which in turn are heated by oil circulating through a thermostatically controlled bath. A sinusoidal vibration of constant amplitude is applied to the moving block and this causes a corresponding force to be imposed on the rubber through the springs (B).

During vulcanization, the modulus of the rubber increases and the movement of the paddle decreases. This movement is magnified by a mechanical spring and lever arm assembly (C) and recorded on a rotating drum. A chopping device, above the recording lever, ensures that the pen marks the paper at the two positions of maximum force in each cycle.

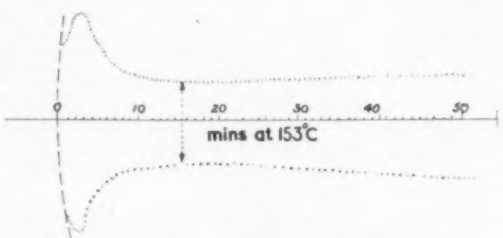

Fig. 5. An experimental trace obtained from the Shawbury curometer

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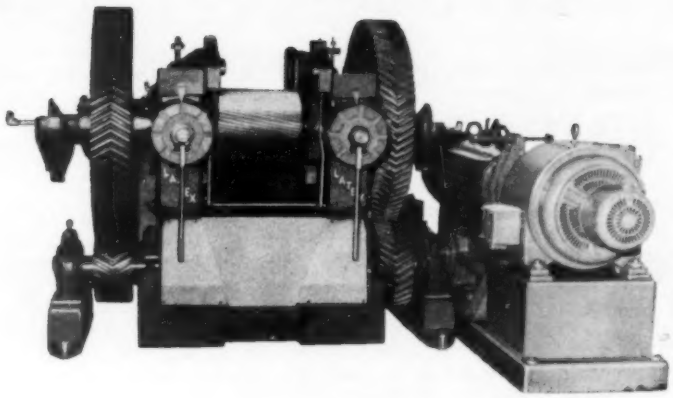

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Laboratory Mill Guard

DEVELOPMENT AT RABRM

By D. G. LAMB*

IT is very noticeable in visiting rubber and plastics plants in the UK, the USA and various European countries that although very considerable care is taken over safety precautions on mills and calenders in factories *little* or *no* protection is provided for laboratory workers on laboratory scale machines of this type. It is often stated that on laboratory mills guards are as dangerous or more dangerous, due to a false sense of security, than no guard at all, or that the experimental mixer must be given complete freedom of action. It can be stated categorically that this is not so once operatives have got used to the types of guard that have been devised following on the careful study by Mr R. W. Lunn of the Leyland and Birmingham Rubber Company.

The types of guard designed using Mr Lunn's principles on the 12in. x 6in. standard laboratory mill (*RJIP* March 23 1957) have now been in use for five years with complete satisfaction and complete freedom from accidents in spite of the mills being used to train many young assistants in rubber mixing techniques.

6in. x 2in. Mill

For use in the increasing work of evaluating new and modified rubber-like polymers, RABRM recently acquired a miniature mill. As supplied this had no guard and constituted a serious menace.

The Lunn sensitive type guard is generally suitable for mills down to 6in. diameter rolls, providing the braking is adequate. The required finger length on the roll surface is such that for a 2in. diameter roll the gate would have to be in such a position that the mill would not be workable. RABRM have installed a 6in. x 2in. diameter mill in their millroom and designed and fitted to it a fingertip control guard.

The mill is shown below in the open position for cleaning (*on left*) and (*on right*) with the guard down. Essentially the guard is an inverted U-shaped piece of Perspex $\frac{3}{16}$in. thick, with a $1\frac{1}{4}$in. diameter hole in the top for the admittance of materials to the nip. This piece of Perspex is mounted on $\frac{1}{8}$in. thick steel end pieces (which provide the required holding down weight). To the end pieces are fitted double hinges in the fashion of a double swing door. This permits the guard to swing open from the front or from the rear. Suitable stops on the hinge prevent the guard from swinging right open, but permit the guard to remain in an open position while the mill is being cleaned, or the check plates adjusted for width. The use of Perspex gives a clear view of the mix at the nip, and substantially prevents draughts of air across the top of the rolls, which could be the cause of serious ingredient and heat losses. Fingertip control is obtained by bringing the edge of the Perspex down to within $\frac{1}{2}$in. from the rolls. The guard does not interfere with the use of the standard scraper on either of the rolls.

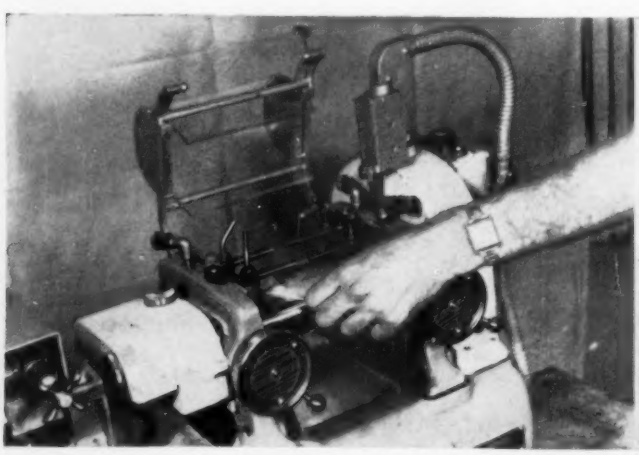
When the guard is in its working position a projection on the side of the guard depresses a switch which makes the holding circuit for the starter coil. Lifting the guard by fingertip releases the switch and breaks the holding coil circuit, thus applying the brake.

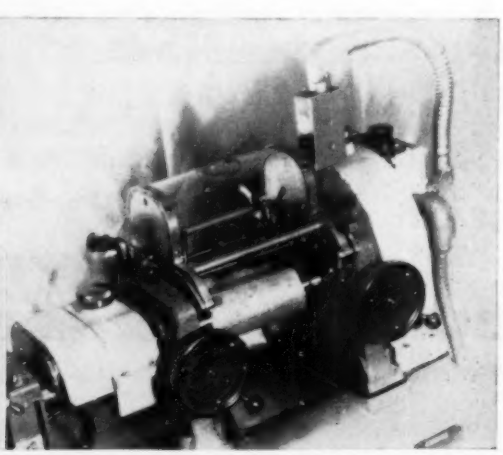
The driving motor for the mill is a $\frac{3}{4}$ hp, three-phase, AC geared motor with an electro-mechanical brake fitted to an extension of the motor shaft. The rear or driving roll has a speed of 17.03 rpm. Operation of the emergency stop gives a negligible overrun, due to the low momentum of the rolls and gearing.

In use the guard has proved satisfactory and there have been no complaints from operators. Batches of raw rubber up to 50g. in weight have been handled without difficulty, while at the other end of the scale, 5g. batches can be used. Working conditions on a 6in. x 2in. mill are of necessity somewhat cramped but are not rendered worse by the presence of the guard. It is this cramped working which is an especial source of danger on a very small mill so that the guard is doubly important.

The RABRM experience on guarding of laboratory type mills is now quite extensive and the Association will be pleased to help any firm in the UK or abroad (not necessarily RABRM members as is usually the case) who wishes assistance in improving the safety of laboratory mills. Do not wait until you have had an accident, apply to the Secretary, RABRM, Shawbury, Shropshire.

*Research Association of British Rubber Manufacturers, Shawbury.





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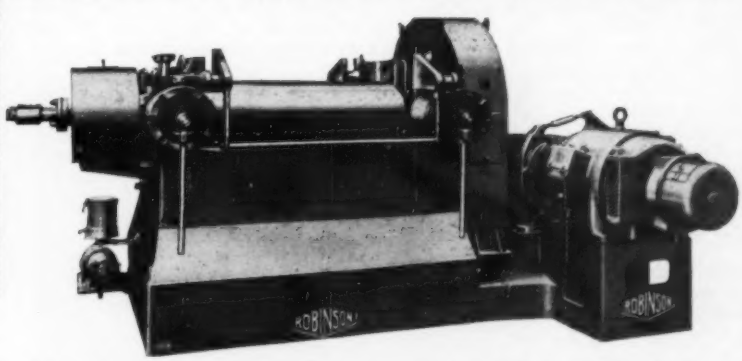

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Plantation Share Survey

THE past 12 months have certainly been good ones for most investors in plantation shares. Higher yields and a rise in the commodity price have, of course, been the main reasons for the jump in capital values.

In a list of the top twenty companies to show the greatest capital appreciation for the year 1959 no less than six of the names were rubber concerns. Of these, top honours went to JUGRA LAND. The rise in value of the share price in this instance showed an increase of 375%. Close behind came CENTRAL PERAK with a 340% gain and KLANANG PRODUCE with a 325% increase. There have been many other outstanding successes.

With returns on top class industrials now on an average of around 3%, this section should continue to attract a good deal of the investors' attention over the next few months. Profit returns for 1960 should again show further improvement and dividends stepped up further.

In the past month news from the board rooms has been flooding in from all directions. The directors of JAVA PARA RUBBER ESTATES have exchanged contracts with the purchaser of the three property undertakings recently agreed to be sold, and have received a deposit, states the chairman, in his annual review. It was decided that the offer should be accepted, having regard to financial and other difficulties which arose in connexion with the development of the properties. The directors consider that reinvestment of the proceeds will yield a higher income than would have been derived from the properties themselves. This sale, together with any distribution by KUALA-NAL KELANTAN RUBBER, will place the company with adequate resources to enable it to take appropriate advantage of any favourable opportunity for further investment, adds the chairman.

Interim Dividend

At a meeting of TIMBANG-DELI (SUMATRA) RUBBER in London last month Mr A. B. Yuille, the chairman, referred to the interim dividend of 2% for the year 1959/60. Whether there will be any further dividend, he said, depended entirely on what sterling remittances were received. So far the company had had no indication on this point.

IPOH RUBBER ESTATES are to make a distribution of 6s. per 1s. share from profits on the sale of estates on January 27 to shareholders registered on December 31. Various outstanding matters have not yet been finalized. It is anticipated, however, there will be a further payment to shareholders of approximately 2s. 3d. a share.

Mr J. L. Burden has told shareholders of his KALI GLAGAH RUBBER COMPANY that a re-grant of a stock exchange quotation for their shares may come 'round about May.' He thought they should then be in a position to go to the stock exchange with records not only of the rubber estate but with three or four years' trading in engineering. The engineering investment had been bought with the £42-43,000 available from the sale of the Malayan estate after the debenture repayment, plus cash that was in the company. Meanwhile, if anyone wanted to sell he would see if a purchaser could be arranged. At the moment, there was every prospect of being able to dispose of any quantity of shares put on offer. Pressed by shareholders—one of whom said he had bought 1,000 shares at 4s. 9d. per share two days prior to the suspension—Mr Burden said the probable price would be 'upwards of 1s. 6d.'

A trading profit of £103,000 against £64,500 was returned by BROOME RUBBER PLANTATIONS. The dividend was raised 8% to 20%. Chairman's speech noted 'there now remains £19,978 of debentures outstanding which are proposed to be redeemed as soon as necessary formalities can be completed.'

Take-Over Stakes

An offer worth 46s. a share for the entire, or at least 80% of the capital of NORTH HUMMOCK (SELANGOR) RUBBER has been made on behalf of Mr Lim Hee Hoe of Kuala Lumpur. The board have already recommended acceptance of an offer of 44s. 6d. per £1 unit from SEE HOY CHAN LTD. of Malaya.

After tax of £51,800 against £36,600 net profits of MALAYA GENERAL come out at £72,200 compared with £27,700 last time. The directors are paying 30% on the capital increased by last year's acquisition of SEDENAK RUBBER ESTATES. There is also a scrip issue of two-for-five from a revaluation of the company's estates.

Another company involved in the take-over stakes was BUKIT RAJAH RUBBER. SEAFIELD AMALGAMATED RUBBER has made a share exchange and cash offer for the 326,000 £1 stock units not already held by it in Bukit Rajah. The terms of the offer are eleven Seafield shares and 5s. cash for each £1 stock unit.

MERLIMAU PEGOH is offering two of its 2s. shares plus 1s. cash for each of the 600,000 issued 2s. stock units of JASIN (MALACCA) RUBBER ESTATES.

Good results have been returned by ESCOT RUBBER ESTATES whose net profit has improved from £10,900 to £18,000 after tax of £13,000 against £9,300. Shareholders get a dividend of 30% for the year to September 30 1959 compared with 20% on the previous occasion. MALAY RUBBER PLANTERS was another company with good news for shareholders. In this particular case profits of £26,400 compare with £14,700. This is after meeting a tax bill of £20,100 (£13,100). The dividend has been effectively raised by 25% to 75%, and a capital distribution of 25% (same equivalent) has been recommended.

Following the registration of a Minute of the High Court, the merger of BUKIT SEMBAWANG RUBBER and SINGAPORE UNITED RUBBER PLANTATION became effective on January 6. BUKIT SEMBAWANG is to make a capital distribution of 11d. per 1s. stock unit from capital surpluses on sale of land unsuitable for the company's original purpose. It has also declared an interim of 10% out of revenue profits. These payments are on the capital as increased by the merger with SINGAPORE UNITED. This is the first occasion an interim has been paid out of revenue profits since 1926. The board has indicated that it foreshadows a total for 1959-60 in excess of the single 12½% paid for 1958/59 when a capital profits distribution of 3d. per unit was also made.

KINTA KELLAS RUBBER are raising their half-time payment from 5% to 12½%. For the whole of last year 25% went to shareholders. A previous loss of £2,100 has been turned into a profit of £777 by ASAHAN RUBBER ESTATES, and the company returns to the dividend list again with a payout of 4%. SUNGEI CHINOH RUBBER profits for the twelve month period are £16,900 as compared with £1,200 for a nine month trading spell. Here the dividend is doubled at 10%.

SUNGEI TUKONG RUBBER PLANTATION—Trading profits £19,700 against £4,000. Up goes the dividend from 4% to 10%. Estimated crop 1959-60 is 900,000lb. of which 333,244lb. have been sold to date at an average of 33.98d. per lb. London landed equivalent. Overall yield per acre, the directors report, has continued to improve.

Rubber Footwear

CANADIAN IMPORTS TREBLED

Imports of low-priced rubber footwear into Canada reached the highest level in history in the first nine months of 1959. John Falconer, Montreal, newly-elected chairman of the Canadian Rubber Footwear Information Office, said at the annual meeting that Canadian rubber footwear industry is in an extremely serious position.

'Imports of rubber-soled canvas footwear in the first nine months of 1959,' he said, 'increased by 58.9% over the corresponding period of 1958 to seize 66.7% of the Canadian market. Imports of waterpoof rubber footwear—this type of footwear now being the backbone of our industry—have increased by 102.7% capturing 31.4% of our markets.' Mr Falconer added: 'In just two years waterproof rubber footwear imports have trebled.'

Rubber Statistics

BRAZIL — FRANCE — WESTERN GERMANY

THE Comissao Executiva de Defesa da Borracha, in its latest statement on the Brazilian rubber position, shows that during the first three-quarters of last year, the country produced 15,960 tons of crude natural rubber and 1,015 tons of natural latex. In addition, 17,178 tons of crude natural rubber were imported during this period, together with 113 tons of latex, making a new supply total of 33,138 tons of crude and 1,128 tons of latex.

Consumption of natural rubber up to the end of September amounted to 31,736 tons of crude and 895 tons of latex. At the end of September, stocks of crude, which at the beginning of the year had amounted to 4,193 tons, had risen to 4,833 tons, of which 1,577 tons were held in producing areas, 2,755 tons in consuming centres, and 501 tons were afloat. Stocks of latex had fallen slightly during this year, and stood at 315 tons at the end of the period.

Imports of synthetic rubber during these months totalled 6,575 tons and included 5,556 tons of SBR, while consumption of synthetic amounted to 6,034 tons, including 4,537 tons of SBR. Stocks at the end of September stood at 1,444 tons, having risen to this total from 657 tons, at which level they stood at the beginning of 1959.

Reclaim production during these nine months totalled 5,765 tons, while consumption amounted to 5,624 tons. Stocks of reclaim at the end of September stood at 373 tons.

France

The Secretariat of the International Rubber Study Group has now issued details of the French rubber position up to the end of September last.

During these first three-quarters of the year, imports of natural rubber totalled 91,155 tons, of which 82,753 tons were in the form of crude rubber and 8,402 tons of latex. During the corresponding period of 1958, natural rubber imports had amounted to some 17,000 tons more. During the period under review, imports from Vietnam fell by some 23,000 tons compared with 1958, to 25,978 tons. At the same time, imports from Malaya rose from 45,242 tons to 49,066 tons. Other countries supplying appreciable quantities of rubber to France included Cambodia (3,292 tons), Indonesia (2,330 tons), the Belgian Congo (5,280 tons) and Ceylon (2,761 tons). Exports of natural amounted to 414 tons, to leave a new supply of 90,741 tons.

Consumption of natural rubber during this period amounted to 87,234 tons of crude and 9,742 tons of latex, falling short of the 1958 total by some 6,000 tons. Stocks at the end of September stood at 7,981 tons of crude and 311 tons of latex, the total having fallen from 14,527 tons to 8,292 tons since the beginning of the year.

Imports of synthetic rubber totalled 46,681 tons, 34,891 tons coming from the USA and 7,320 tons from Canada. Consumption of synthetic amounted to 48,493 tons, and of this figure 34,271 tons consisted of S-Type, 5,152 tons of neoprene and 6,638 tons of butyl. Stocks of synthetic on hand at the end of September stood at 8,962 tons, a slight increase compared with the position at the beginning of the year.

Western Germany

Imports of natural rubber during the first three-quarters of 1959 increased by some 6,000 tons compared with 1958 to 104,948 tons including 94,886 tons of crude and 10,062 tons of latex. Of this total, Malaya supplied 52,745 tons, Indonesia 14,934 tons, Ceylon 8,534 tons, Thailand 3,166 tons, Nigeria 9,501 tons, the Belgian Congo 1,807 tons, Burma 2,904 tons and Vietnam 9,272 tons. After allowing for exports of 626 tons, there remained a new supply available for consumption of 104,322 tons.

The actual consumption totals for this period were 95,726 tons of crude and 9,564 tons of latex, exceeding the previous year's consumption figure by some 5,550 tons. Stocks of natural on hand at the end of September stood at 10,380 tons of crude and 1,280 tons of latex, having fallen by some 3,500 tons during the course of the year.

Home production of synthetic rubber, which totalled 9,998 tons in the first three-quarters of 1958, had risen to 31,697 tons by the end of September 1959. In addition 25,804 tons, as against 29,717 tons in the earlier period, were imported, 18,880 tons coming from the USA, 3,380 tons from Canada and 2,548 tons from Italy. Exports of synthetic amounted to 8,014 tons, leaving a new supply of 49,487 tons. Consumption of synthetic totalled 49,009 tons during these months, an increase of 11,500 tons over the previous year's figure, while stocks at the end of September stood at 6,312 tons, having amounted to 7,224 tons at the beginning of the year.

Reclaim rubber production during these months amounted to 30,411 tons, 2,000 tons more than the previous year, while consumption amounted to 30,223 tons, an increase of nearly 4,000 tons. Stocks of reclaim at the end of September stood at 3,639 tons, having fallen by some 1,200 tons since the beginning of the year.

Measurement and Control

Twenty-eight papers presented at the European Congress of Chemical Engineering and the Achema Congress, 1958, are contained in Volume 35—*Mess und Regeltechnik*—of the Dechema Monographs (Verlag Chemie GmbH, Weinheim/Bergstrasse; price DM. 39.40). Abstracts of the papers in English and French, and a subject index, are included in this volume, which is of interest to those concerned with measurement and control engineering.

This year's 'Young People's Lecture' organized by the PI was given by Dr N. A. de Bruyne, managing director of CIBA (A.R.L.) Ltd., at the Institute of Electrical Engineers in London, to about 500 school children. The lecture was entitled 'Sticky Plastics' and dealt with the structure of some plastic materials, and the problems involved in the use of plastics as adhesives. Here Dr de Bruyne is being hoisted into the air, suspended only on an 'Aerolite'-glued, 1-in. beech lap joint made earlier in the lecture. A similar joint was tested to destruction and failed at a load of 700 lb.

NYLON FOR INJECTION MOULDING

Continued from page 124

It is similarly difficult to give a quantitative indication of the abrasion resistance of nylon on the basis of laboratory tests. Experience indicates that nylon is a very hard-wearing material and in many cases will outlast softer metals and alloys such as brass and phosphor bronze. Abrasion resistance is increased by the use of external or internal lubricants, and depends on moulding conditions. Thus injection into a hot mould produces a harder and rather more wear-resistant surface than does injection into a cold mould. Similarly, surface hardness can often be increased after moulding by annealing at 150-200°C. in a suitable non-oxidizing fluid (*e.g.* mineral oil).

One factor less frequently encountered with metals than with plastics is the phenomenon of cold

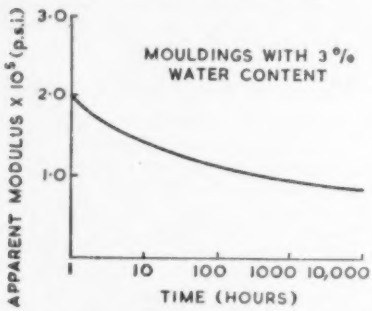


Fig. 3. Relationship between apparent modulus and time

flow. In other words, if a given stress is applied over a prolonged period of, say, several weeks, the strain will be greater than that calculated from the modulus of the material determined in the conventional manner (short time test). Thus the apparent modulus is dependent on the period of observation and will decrease with time as illustrated in Fig. 3.

It will be noted however that most of the change in apparent modulus takes place within the first days of observation. Assemblies incorporating nylon washers or gaskets should generally speaking be retightened a week or so after assembly. It should be noted however that cold flow is not often a serious practical problem.

The life expectancy of a nylon component is dependent upon several factors. Although it has a much higher softening temperature than most thermoplastics, it will not withstand continuous exposure to elevated temperatures in the presence of air. Thus if nylon components are operated continuously at temperatures in excess of 60°C. surface discolouration will occur and some fall in impact strength may occur. At 100°C. the useful life of a moulding can be as low as four to six weeks. A considerably longer life can be expected if the moulding is shielded from direct contact with air, *e.g.* by immersion in oil. At normal atmospheric temperatures, nylon will retain its properties indefinitely provided it is not exposed to direct sunlight, but the useful outdoor life of the material is limited and may be only one or two years in extreme cases, such as under tropical conditions. Special stabilized grades are available and these should always be specified where heat and light resisting properties are required. However at the present time most nylon components are used under conditions where the problem of weathering does not arise.

REFERENCES

[1] Injection Moulding Polyamides.' *British Plastics*, September 1954.

[2] *Proceedings of A.S.T.M.* **54,** 1314-29 (1954).

[3] *Plastics Technology*, April 1956, p. 221.

[4] *Engineering Materials and Design*, December 1958.

PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Waterproof Sheet Material

No. 819,706. Montecatini Societa Generale per l'Industria Mineraria e Chimica. Application and Filed, July 18 1957. Application in Italy, July 19 1956. Published September 9 1959. Addition to No. 810,023.

A waterproof sheet material for waterproofing roofs and structures is based on a linear polymer of butene-1 having an average molecular weight above 20,000 and being at least partly of isotactic structure. Three materials are mixed with the polybutene, namely, (a) 2 to 15% of a material to protect the polymer against ultra-violet light, *e.g.*, carbon black or bone black; (b) 25 to 50% of an inert inorganic filler, *e.g.*, talc, calcium carbonate or quartz; and (c) 0.2 to 1% of an antioxidant, all percentages being based on the total weight of the butene plus the additives.

The polybutene sheet is for use in the building industry instead of tarred paper and tarred felt. It has a tensile strength several times greater than these prior materials as well as much higher deformability before break, thus being more adaptable in regard to the thermal expansion of structures to which it is applied.

Silicone Rubber Tyre

No. 819,844. Midland Silicones Ltd. Application and Filed, October 2 1957. Application in USA, February 15 1957. Published, September 9 1959.

A pneumatic tyre comprises silicone rubber reinforced with metal cords, the silicone rubber being of such a kind that it adheres to the metal cords and has sufficient tack for proper building of the tyre. The silicone rubber is the product of vulcanization of a mixture consisting essentially of (a) 100 parts of a polysiloxane of at least a million cs. viscosity at 25°C. in which the organic radicals are monovalent hydrocarbon radicals or halogenated monovalent hydrocarbon radicals, (b) 1 to 10 parts of an aliphatic hydrocarbon silicate or a partial hydrolysate of such a silicate, and (c) 15 to 100 parts of a silica filler having a surface area of at least 100 sq. metres per gram, the surface of the silica being saturated with organosilyl groups. Silicone rubber tyres made according to the invention are resistant to heat and to weather and can be used under conditions where no other previously known rubber tyre will operate satisfactorily.

Lining Pipes and Vessels with Plastics

No. 820,121. T. I. (Group Services) Ltd. Inventors: A. Charlesby and S. H. Pinner. Application, May 2 1956. Filed, August 2 1957. Published, September 16 1959.

In a process for lining metal pipes and cylindrical vessels with polythene and similar polymers, the polymer is subjected to high energy irradiation to increase its melting point. In one method, a tube of polythene of outside diameter slightly less than the inside diameter of the pipe is inserted in the pipe and saturated with a monomer, *e.g.*, a solution of methyl methacrylate, to cause the tube to swell into contact with the walls of the pipe. The assembly is then irradiated to convert the monomer into polymer and render the swelling permanent.

In an alternative method, a tube of polythene is irradiated before use and advantage is taken of its resulting increased temperature resistance to tension draw it at a temperature above its normal crystalline melting point. The tension drawing reduces the diameter of the tube so that it can be cooled and placed inside the rigid pipe and then reheated to allow it to expand into contact with the walls of the pipe.

Rubber Markets

LONDON

The main feature of the London rubber market during the week has been the firmness of Spot and nearby positions on short covering. The Spot is 1⅛d. higher at 36¼d. per lb. while nearby positions are around 1d. per lb. dearer. Trading generally has been quiet. The distant positions recorded little change.

Latest prices are as follows:

No. 1 RSS Spot: 36d.-36¼d.

Settlement House:

February 34⅝d.-34⅞d.

March 33⅛d.-33⅜d.

April/June 32⅛d.-32⅜d.

July/September 31⅜d.-31⅝d.

October/December 31d.-31⅛d.

No. 1 RSS cif basis ports:

February 33⅜d.-33⅝d.

March 33⅛d.-33⅛d.

Godown:

February 113½ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, January, February, March 20s. 1d., cif European ports. Spot, 20s. 6d. Bulk, d.w., 19s. 9d. Creamed, seller, January, February, March 19s. 7d. Normal, seller, January, February, March, 15s. 5d.

AMSTERDAM

The Amsterdam rubber market ruled as follows on January 18:

	Guilders per kilo	
No. 1 RMA	Jan. 18	Previous
January	3.24½	3.27
February	3.24½	3.27
March	3.24½	3.27
January/March ..	3.23	3.27
April	3.13½	3.15
May	3.12½	3.15

Sales: 15 Tendency: Quiet

DJAKARTA

Sheet No. 1 for ready delivery was quoted at 56.00 rupiahs per kilo at noon on January 18, but showed an increasing tendency at the close at 57.25 rupiahs, buyers per kilo. Sellers, however, asked 58 rupiahs. There was only trading interest for brown No. 3 totalling five tons at 35 rupiahs per kilo. The market closed quiet. Sheet No. 1 for ready delivery remained at 57.25 rupiahs per kilo buyers.

	Rupiahs per kilo	
	Jan. 18	Previous
Spot No. 1 Priok ..	56.00b	57.00b
Spot No. 2 Priok ..	55.00b	56.00b
Spot No. 3 Priok ..	54.00b	55.00b
No. 1 fine pale crepe, spot	51.00b	51.00b

Tendency: Quiet

SINGAPORE

The market was inactive on January 18 and business was mostly confined to tidying-up of outstanding orders. Most dealers showed no inclination to trade and factories were quiet. The market continued very quiet in after-hours trading. No. 1 RSS for February delivery was quoted a quarter of a cent above the final level on January 15 at 113⅝ Malayan cents a lb.

	Straits cents per lb., fob Malayan ports to open ports	
	Jan. 18	Previous Close
No. 1 RSS, Feb.	113⅛–113½	113½–113⅝
Mar.	113⅛–113⅜	113¼–113½
No. 2 RSS, Feb.	112⅝–113⅛	113 –113⅜
No. 3 RSS, Feb.	112¼–113¼	112⅝–113⅛
No. 4 RSS, Feb.	113⅜–112⅝	111⅛–112⅛
No. 5 RSS, Feb.	109½–111⅛	109⅛–110
No. 1 Spot ..	113⅛–113⅞	113⅛–113⅞
No. 3 blanket, thick remilled, Feb. ..	112¼–113⅛	112¼–113⅛
No. 1 fine pale crepe, Feb. ..	130 –132	129⅜–131¼
2x Thin brown crepe, Feb. ..	110⅜–111⅛	110⅛–111⅛

Tendency: Very quiet

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums fob at 203.00d. per gallon.

NEW YORK

The New York rubber market ruled as follows on January 18:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Jan. 18	Previous
No. 1 RSS, Jan.	40⅛s	40⅛n
Feb.	40⅛s	40n
No. 2 RSS, Jan.	40⅜s	40⅛n
Feb.	40⅛s	39⅞n
No. 3 RSS, Jan.	40⅛s	40n
Feb.	40s	39⅞n
No. 1 RSS, Spot	40⅛s	40⅛n
No. 3 amber blanket crepe, Mar.	39⅝b–40¼a	39⅝b–39⅞a
No. 1 latex, thin crepe, Jan. ..	44⅛n	44⅛n
No. 1 latex, thick crepe, Jan. ..	44⅛n	44⅛n

FUTURES—REX CONTRACT

	US cents per lb.	
	Close	Prev. Close
Jan. ..	40.45b–41.00a	40.45b–40.75a
Mar. ..	39.90b–39.95a	39.70t
May ..	39.00t	38.80t
July ..	38.15b–38.25a	37.90b–38.10a
Sept. ..	37.55b–37.75a	37.50b–37.75a
Nov. ..	36.88b–37.10a	36.75b–36.90a
Jan. ..	36.45n	36.35n

Sales: 46 Tendency: Steady

Rubber futures were very steady in light dealings on January 18. Some covering and trade buying aided the market. Physicals were quiet and the undertone steady. Shipment offerings were limited in quantity but factories did negligible buying in the physical market.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on January 18 was 36.25 (36.25) US cents per lb.

CEYLON

No. 1 RSS

The price of No. 1 RSS spot at Colombo on January 18 was 130 (130) Ceylon cents per lb.

JOHN BULL DIRECTOR

Dr A. P. C. Cumming has been appointed technical director of the John Bull Rubber Co. Ltd. He took up his new duties on January 18.

Dr Cumming took the First Class Honours degree in Applied Chemistry

DR A. P. C. CUMMING

of Glasgow University at the Royal College of Science and Technology, and later a Ph.D. in chemical engineering at Birmingham University. Among the many prizes and awards which he gained during his academic career was a Salter industrial research fellowship in chemical engineering at the University of Birmingham and he was also accorded the honour of being appointed a research associate on the Faculty of the Chemical Engineering Department, Massachusetts Institute of Technology, USA. In this capacity he carried out research work on combustion, and undertook further post-graduate study.

Dr Cumming has held a number of chemical engineering positions and joins the John Bull Rubber Co. Ltd., from Laporte Chemicals Ltd., where he was head of the chemical engineering department.

The amount of stock of Bukit Sembawang Rubber Company for which the Stock Exchange Council ordered quotation was £133,022 10s.

Bukit Mertajam Rubber Co. Ltd. announce that they have received over 85% acceptances from Sungei Siput Rubber Co. Ltd.

Industry INTELLIGENCE

Technical Data

Ko-Blend I.S.

Ko-Blend I.S. is a masterbatch of equal parts of insoluble sulphur and non-staining SBR. It is made by mixing a colloidal aqueous dispersion of insoluble sulphur with SBR latex, coagulating the mixture and then drying under carefully controlled conditions. The finished product is a dry crumb in which the fine particles of insoluble sulphur are uniformly dispersed.

The main uses of Ko-Blend I.S. are in the following types of compound: (1) Light-coloured stocks such as the new types of soling compound, where ordinary powdered sulphur may cause sulphur bloom and ordinary insoluble sulphur may present dispersion troubles; (2) low plasticity stocks; (3) white sidewall compounds; (4) camelback and tyre repair stocks; (5) compounds requiring maximum building tack; (6) nitrile rubber stocks. Ko-Blend I.S. is produced by the General Tire and Rubber Co. and is distributed in the UK by Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4, from whom I.S.3 is available containing full technical details of the material.

Hypalon 40

Hypalon 40 is a new chlorosulphonated polythene having low nerve, high unvulcanized strength and good processing viscosity. Compared with Hypalon 20, vulcanizates of Hypalon 40 have improved tensile and tear strength, greater elongation, better abrasion resistance and lower compression set. Detailed information on Hypalon 40 is contained in Du Pont Report No. 59-2, by P. A. Peffer, J. B. Knox and A. J. Brandau. This report is distributed in the UK by the Du Pont Co. (UK) Ltd., 76 Jermyn Street, London, S.W.1.

The excellent processing characteristics of Hypalon 40, as demonstrated in the laboratory and during extensive factory evaluations, place it in a category far superior to Hypalon 20 and many conventional elastomers. It is comparable in extrusion and calendering characteristics to Neoprene Type WB. Vulcanizates of Hypalon 40 combine the excellent oil-resistance of neoprene with heat-resistance comparable to Hypalon 20. Comparative data are included for Hypalon 40 and Hypalon 20 vulcanizates. Mixes based on Hypalon 40 for the following products are given: Conveyor belt covers, fabric coatings, wire and cable coverings, hose, moulded goods (white and black compounds), roll coverings and chemically-resistant linings. Data for the physical properties of the vulcanized compounds are included together with results of ageing tests in many cases.

Rigidex Polythene for Reinforcing Conventional Polythene

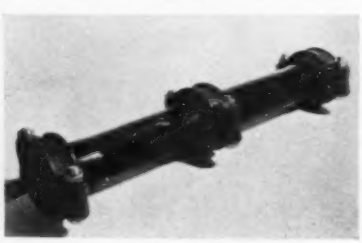
Rigidex high-density polythene is much stiffer than conventional polythene and has a higher softening point, a higher tensile strength and greater resistance to solvents. Rigidex can be blended in all proportions with conventional polythene to improve the properties of the latter, as described in Rigidex Technical Information Sheet No. 5, issued by British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.

The data show that by the blending of Rigidex with conventional polythene, the stiffness, tensile strength, softening point and resistance to solvents are increased approximately in proportion to the content of Rigidex in the blend. The addition of Rigidex does, however, impart a stiffer flow to conventional polythene of melt index 20, but this reduction in flow properties can be minimized if Rigidex type 50 (melt index 5) is used. Also, the blends would normally be moulded at slightly higher temperatures than 100% conventional polythene, and this would help to compensate for the somewhat stiffer flow. Rigidex and conventional polythene can be hot-blended in any standard mixing equipment such as two-roll mills, internal mixers and extruder mixers. With screw-type, preplasticizing, injection-moulding machines, it is often sufficient to add a dry blend of pelleted Rigidex and conventional polythene to the machine. The degree of mixing given by the plasticizing screw is adequate for many applications. This dry-mixing technique is not usually satisfactory when used on a normal ram-type injection machine because intimate mixing is more difficult to achieve.

Machines, Materials and Equipment

Jointing Plastic Pipes

The Victaulic joint, widely known and used for the jointing of steel tubes, is also increasingly used for the jointing of plastic pipes. It consists of a composition of self-sealing ring and metal housings which embrace the two pipe ends firmly. The housing accurately centralizes the self-sealing ring and keeps it firmly in position to maintain leak tightness. It is suitable for fluids and gases under pressure or vacuum.



For flexible polythene pipes, the Victaulic joint can be adapted by the provision of metal or plastic inserts which slip into the pipe ends, thereby maintaining roundness. There is no need to groove the pipe, since it is sufficiently pliable for each joint to press its own grooves. The joint is assembled in the normal way and the application of the bolt load is sufficient to deform the plastic tube to the exact shape of the joint gland, the resistance to deformation being accommodated by the strength of the plastic pipes or metal insert, which is designed for this purpose.

Extensive research by the Victaulic Company, 8 Gough Square, E.C.4, on joints up to 6in. dia. has begun recently, and it has been established that polythene pipes jointed in this manner can be pressurized until they burst, without separation.

Molecular Models

Units from which molecular models, accurate with respect to stereo characteristics, can be quickly built up are produced by the Buchi Company, of Switzerland. They consist of little rods and tubes which are soldered together at the correct angles at a point representing the atomic nucleus; the free ends represent atoms of hydrogen, so that the individual units represent CH_4, H_2O, NH_3, etc. Distributors for this country are L. Light and Co. Ltd., Colnbrook, Bucks.

New Publications

Optical Sheet

BX Plastics Ltd., Higham Station Avenue, London, E.4, have recently issued a brochure on their optical sheet—Xylonite (Cellulose Nitrate) and Bexoid (Cellulose Acetate). Details are given of a wide variety of configurations, and of a range of over 60 colours.

Asbestos

'Asbestos and Asbestos-Cement Products' is the title of a new 28-page technical information booklet from Turners Asbestos Cement Co. Ltd., of Trafford Park, Manchester 17. Well produced and illustrated, it is designed for general distribution, and deals with asbestos as a raw material and the extensive range of asbestos cement products.

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

Tuesday January 26 at the Institution, 4 Kensington Palace Gardens, London, W.8. Council Meeting at 2.15 p.m.

Burton-on-Trent Section.—Monday February 1 at the Midland Hotel, Burton-on-Trent, at 7.30 p.m. 'Ageing and Weathering of Rubbers and Some Plastics,' by Dr W. McG. Morgan (Monsanto Chemicals Ltd.).

Merseyside Section.—Friday January 29 at 7 p.m. Visit to the Nuclear Physics Laboratory, University of Liverpool.

North-Eastern Section. — Monday February 1 at the Eldon Grill, Grey Street, Newcastle, at 7 p.m. 'Process and Quality Control,' by C. W. Evans, A.R.T.C.S., A.I.R.I. (Dunlop Rubber Co. Ltd.).

South Wales and Monmouthshire Section. — Friday January 29 at the Park Hotel, Cardiff. Annual dinner and dance.

PLASTICS INSTITUTE

London Section.—Tuesday February 2 at the Wellcome Building, 183/193 Euston Road, N.W.1, at 4 p.m. Symposium on 'Preplasticizing in Injection Moulding.'

Plastics and Polymer Group, Society of Chemical Industry. — Tuesday January 26 at the SCI Meeting Room, 14 Belgrave Square, London, S.W.1, at 6.30. 'Polymerization and Copolymerization of Itaconic Acid and Its Derivatives,' by Dr J. F. Buckley (Charles Pfizer and Co. Ltd.).

COMPANIES in the NEWS

Amsterdam Rubber Company

The Board of Rubber Cultuur Maatschappij Amsterdam (Amsterdam Rubber Company) has declared an unchanged 5% dividend for the fiscal year 1959. It will have to be approved by the general shareholders' meeting which is scheduled to be held in the latter half of February.

British Industrial Plastics

British Industrial Plastics is raising its dividend by 2½% for the year to September 30 1959, and proposes to capitalize £1,476,812 of reserves in a one-for-one scrip issue to holders of January 15.

The final dividend is 15%, making 22½% on the £1,475,812 capital. For the previous year the final was 12½% on £1,473,812 capital and the interim was 7½% on £1,248,8112 capital prior to a one-for-six 'rights' issue.

Group profit expanded from £979,129 to £1,113,026, and the net profit is up from £312,508 to £445,616.

Mr J. Urban, Monsanto Chemicals Ltd., left by air for Karachi on January 19.

Forth Chemicals Ltd

Forth Chemicals Ltd. have announced that the selling price of their monomeric styrene is being reduced by £5 per ton, effective from January 15 1960. The last price reduction, of £4 per ton, was made in March 1959.

Monomeric styrene is used for the manufacture of polystyrene, and in the manufacture of synthetic rubber, paints and resins. Forth Chemicals Ltd. is owned two-thirds by British Hydrocarbon Chemicals Ltd. and one-third by Monsanto Chemicals Ltd. British Hydrocarbon Chemicals is itself jointly owned by the British Petroleum Co. Ltd. and The Distillers Co. Ltd.

Polyflex Reductions

Further price reductions of Monsanto's Polyflex sheet will become effective from January 25. A reduction of 6d. per lb. is being made in the prices of crystal clear Polyflex 100 in gauges between 0.005in. and 0.015in., while 0.020in. gauge is reduced by 4d. per lb.

The new prices apply to the recently introduced vacuum-forming and pressure-forming grades, as well as to the standard material. Similar reductions are being made in the prices for coloured Polyflex in these gauges.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on January 6 1960

Rubber Improvement Ltd., and J. Lewis. Footwear. 826,378.

Rubber Improvement Ltd., and J. Lewis. Footwear. 826,379.

Petrochemicals Ltd. Polymeric compositions. 826,483.

Phillips Petroleum Co. Chlorinated polythene and process for production thereof. 826,495.

Phillips Petroleum Co. Process for recovery and purification of polymers. 826,416.

E. I. Du Pont De Nemours and Co. Stabilized non-gelling aqueous dispersion compositions and process of making same. 826,455.

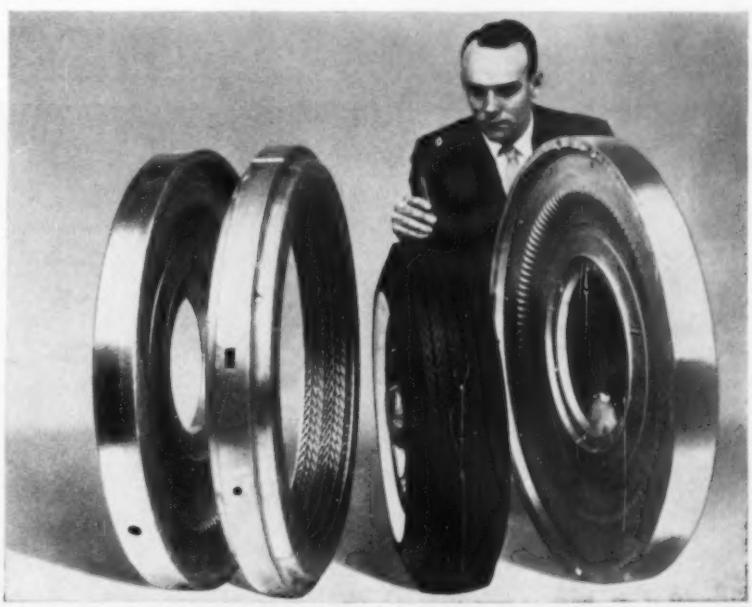
Westinghouse Electric Corp. Dicyandiamide-phenol-aldehyde resinous compositions and laminates prepared therefrom. 826,458.

American Cyanamid Co. Preparation of Δ^1, ^{4}-steroids. 826,395.

W. Ellinghaus and H. Hilgers (trading as Benz and Hilgers Maschinenfabrik). Device for measuring, moulding and delivering plastic materials. 826,470.

Connecticut Hard Rubber Co. Heat resistant high-tensile silicone rubber compositions and methods of making them. 826,322.

Esso Research and Engineering Co. Non-sulphur cure of rubbery copolymers. 826,436.



The Firestone Tire and Rubber Co., Akron, Ohio, claims to have developed a tyre moulding system which produces a tyre more perfectly round than normal. This has been achieved by moulding the tyre in a threepiece mould instead of the conventional two. This method provides an unbroken tread design. The first tyre to be produced on the new mould will be the nylon '500' 'True Tread', illustrated, and the company states that these tyres will have the following advantages: Improved traction for all driving conditions; tread wear improved by up to 35%; smoother operation; better durability at high speeds; and increased stability

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

(776,176) For rubber bands included in Class 16. By Caton Ltd., Mermaid House, 70 St. Thomas Street, London, S.E.1. To be associated with No. 663,252 (3680, 854) and another. (Class 16; September 2 1959.)

PLANCROM (782,341) For sheets, rods, tubes (not parts of machines) and shaped sections, all made of plastics or of laminations of plastics and metal, the plastics predominating and included in Class 17. By Creators Ltd., Plansel Works, Albert Drive, Sheerwater, Woking, Surrey. (Class 17; September 2 1959.)

HYPATEX (788,157) For tiles, in which rubber, rubber compositions, synthetic rubber, synthetic resinous plastics or mixtures of two or more of these materials predominate. By Sussex Rubber Co. Ltd., School Road, Willesden, London, N.W.10. (Class 19; September 2 1959.)

STAFLAN (787,784) For piece goods made of natural or synthetic textile materials; and piece goods made of plastics of the kind used for making up into articles commonly made of fibrous textiles; all coated wholly or partly with thermo-plastic resins, the piece goods predominating, and being goods for use by lamination for stiffening or reinforcing. By the Staflex Co. Ltd., Staflex House, 5 Bainbridge Street, London, W.C.1. To be associated with No. 728,689 (3980, 900) and others. (Class 24; September 2 1959.)

RUBLASTIC (787,044) For all goods included in Class 25, made of synthetic rubber. By Rubber Plastics Ltd., Upper Basildon, near Pangbourne, Berkshire. To be associated with No. 782,127 (4199, 17).

(775,075) For carpets, floor rugs, mats included in Class 27 and matting; linoleum, floor coverings made of rubber or of imitation rubber; and wall hangings (non-textile). By A/S Askim Gummivarefabrik (a Joint Stock Company organised under the laws of Norway), Askim, near Oslo, Norway. Manufacturers—March 6 1958. Address for service is c/o Haseltine Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. To be associated with No. 775,072 (4227, 755). Class 25; September 2 1959.)

POLY-STORERS (792,880). Packaging materials made of plastics. Trumod Ltd., 205 Hook Road, Chessington, Surrey. (Class 16; December 2 1959).

SKAI (792,109) Foils, films and sheets, all of plastics, and included in Class 17. Konrad Hornschuch Aktiengesellschaft Werk Weissbach, Weissbach/Württemberg, Germany. Address for service is c/o Trade Mark Consultants Co., 13 St. Mary's Road, London, N.W.11. (Class 17; December 2 1959).

GAYLUX (789,180). Plastics included in Class 17 in sheet form. Linolite Ltd. The Mill Works, Burnivale, Malmesbury, Wiltshire. (Class 17; December 2 1959).

SILRAMA (793,037) Silicones being chemical preparations for use in industry. Union Carbide Corporation, 30 East 42nd Street, New York 17, USA. Address for service is c/o Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2. (Class 1; December 2 1959).

DENOFIX (791,528). Mixtures of polyesters, pigments and extenders, being chemical products for use in cementing and filling cracks, cavities and the like defects in car bodies, ships, boats and the like. De Nordiske Fabriker De-No-Fa Aktieselskap, Prinsensgate, 2 Oslo, Norway. Address for service is c/o McKenna and Co., 12 Whitehall, London, S.W.1. To be associated with No. 373,118 (2004,852) and others. (Class 1; December 2 1959.)

LECTON. (787,651). Fabrics made of glass fibres coated with acrylic resin, enamel coverings for wire in the form of varnish or of coated fabrics and impregnating varnish of acrylic resin, all being electrical insulating materials. E. I. Du Pont De Nemours and Co., 1007 Market Street, Wilmington, Delaware, USA. Address for service is c/o Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2. (Class 17; December 2 1959).

CASCALLOY (793,509) Containers made of plastics and included in Class 21. The British Xylonite Co. Ltd., Highams Park, London, E.4. To be associated with No. 634,051 (3507,298) and another. (Class 21; December 2 1959).

'SOLUS' (788,038) Shopping bags made of plastics, pocket wallets, cases (in the nature of wallets) made of leather or of plastics for holding pyjamas; and umbrellas, walking sticks and brief cases. Hope Bros. Ltd., 46 Ludgate Hill, London, E.C.4. (Class 18; December 2 1959).

FABRITREAT (B790,047) Chemical preparations consisting of silicones, synthetic resins and hydrocarbon solvents, being goods for application to fibrous materials to render them water repellent. Silicone Treatments Ltd., 56 The Boulevard, Crawley, Sussex. (Class 1; December 2 1959).

FOSTARENE (789,121) Plastics and synthetic resins, all in the form of powders, granules, pellets, dispersions, liquids and emulsions. Foster Grant Co. Inc., 289 North Main Street, Leominster, Massachusetts, USA. Address for service is c/o Haseltine, Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 1; December 2 1959).

NEW COMPANIES

J. and J. Haling (Plastic Converters) Ltd. (642,532).—November 20. Capital: £2,000 in £1 shares. To carry on the business of manufacturers of and dealers in all kinds of plastic and leather goods, airbeds, shopping bags, handbags, etc. The directors are: Joseph Helingoe and Sarah E. Helingoe both of 5 Chislehurst Avenue, Blackpool; John Helingoe and Helena M. Helingoe both of 187 St. Albans Road, St. Annes on Sea. Regd. office: 126 Portland Street, Manchester, 1.

Corris Fillers (Sales) Ltd. (642,516).—November 20. Capital: £2,000 in £1 shares. To carry on the business of manufacturers, miners, producers of and dealers in filers and filling compounds, synthetic materials and plastic products, etc. The directors are: Enoch A. Duffield, 24 Curzon Park North, Chester; John E. Head, 'Chehalis,' 12 Kenilworth Road, Sale, Ches. Regd. office: 24 Curzon Park North, Chester.

Mahawale Holdings Ltd. (644,774). —December 17. Capital: £100 in £1 shares. To acquire the whole or any part of the issued share capital of Mahawale Rubber and Tea Co. Ltd. The subscribers are: Alfred Hollington, 20 Eastcheap, E.C.3, company director; George Fellowes, 20 Eastcheap, E.C.3, company director. The first directors are to be appointed by the subscribers. Reg. office: 20 Eastcheap, E.C.3.

Woodside Plastics Ltd. (644,804) —December 17. Capital: £1,500 in £1 shares. To carry on the business of manufacturers and purchasers of and wholesale and retail dealers in all or any articles manufactured or derived from any form of plastic materials, etc. The directors are: William B. Bolton, 48 Blackburn Road, Darwen; George Bury, Greystones, Bolton Road, Ewood, Blackburn; Donald N. Hamer and Harry Peterson. Reg. office: Falcon Works, Falcon Avenue, Darwen, Lancs.

Commercial Tyres (Sussex) Ltd. (644,565) —December 15. Capital: £5,000 in £1 shares. The directors are: Reginald C. Trussler and Mrs. Doris J. Trussler, both of Longmeadow, Pine Grove, Chichester. Reg. office: 104 The Hornet, Chichester.

Injection Moulded Plastics Ltd. (644,690). —December 16. Capital: £4,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, plastic moulding and moulding materials, etc. The subscribers are: Alec D. M. Sorrell, Lloyds Bank Chambers, 81 High

The instrument panel in the control room of the new plant recently opened by B.I.P. Chemicals Ltd. at Oldbury for the manufacture of formaldehyde. The production process selected uses methanol as its starting point. The complete layout includes storage for methanol and formaldehyde, a cooling tower, refrigeration plant and electric sub-station

Road, Wood Green, N.22; Wilfred D. Wigglesworth, 91 Waterfall Road, N.11 (coal merchant). The first directors are to be appointed by the subscribers. Solicitors: Clagen Wilders and Sorrell, N.22.

Gathier Converters Ltd. (645,736).—December 29. Capital: £25,000 in £1 shares. To carry on the business of manufacturers of and dealers in nylon monofilaments and other synthetic mouldings and extrusions for sporting, industrial, domestic and other purposes, etc. The directors are: Rene Gathier, 58 Bathgate Road, S.W.19, Denis G. Thompson, John W. Underwood, Kenneth E. Skinner and Charles J. W. Lashley. Regd. office: 2 Bow Lane, Cheapside, E.C.2.

Doloswella Holdings Ltd. (644,746). — December 17. Capital: £100 in £1 shares. To acquire the whole or any part of the issued share capital of The Doloswella Rubber and Tea Estates Ltd. or the whole or any part of its undertaking, property and assets, etc. The subscribers are: G. Fellows, company director, and C. A. Meakin, company director, both of 10 Old Jury, E.C.2. The first directors are to be appointed by the subscribers. Reg. office: 10 Old Jewry, E.C.2.

Alper Bros. (Plastics) Ltd. (644,726).—December 17. Capital £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic materials, etc. The subscribers are: Steven J. Ley, 25 Applegarth Road, W.14; James B. Johnson, 56 Truro Road, N.22, Samuel Alper, Napthali Alper and Lawrence Alper are first directors. Reg. office: 34 South Molton Street, W.1.

Commercial Plastics Engineering Ltd. (645,726).—December 29. Capital: £100 in £1 shares. The directors are: Jakob Pomeraniec, 3 Telegraph Hill, N.W.3, Ralph H. Embleton, 10 Ashleigh Grove, Tynemouth, (directors of Commercial Plastics Ltd. etc.). Regd. office: Willington Quay, Wallsend-on-Tyne, Northumberland.

Modern Fittings Ltd. (645,163).—December 22. Capital: £10,000 in 2s. shares. To acquire the business of plastic moulders and fabricators heretofore carried on by Patrick J. N. Elsworth as 'Modern Fittings' at Bolton and Northampton. The directors are: Patrick J. N. Elsworth, and Marjorie R. N. Elsworth, (directors of Fenestiation Co. Ltd.), both of South Bank, New Church Road, Bolton, Lancs. Regd. office: South Bank, New Church Road, Bolton, Lancs.

COUNTY COURT JUDGMENTS

NOTE.—These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.

ANTHONY C. WHITE, 851 Harrow Road, London, N.W.10. Brentford, £71 8s. 8d., September 7 1959.

GORMORANT DISPLAY LTD., 42 Devonshire Street, London, W.1, plastics and rubber goods manufacturers. Bloomsbury, £50 6s. 4d., October 20 1959.

DEFIANCE RUBBER CO., 485-487 Bethnal Green Road, London, E.2. Shoreditch, £21, November 3 1959.

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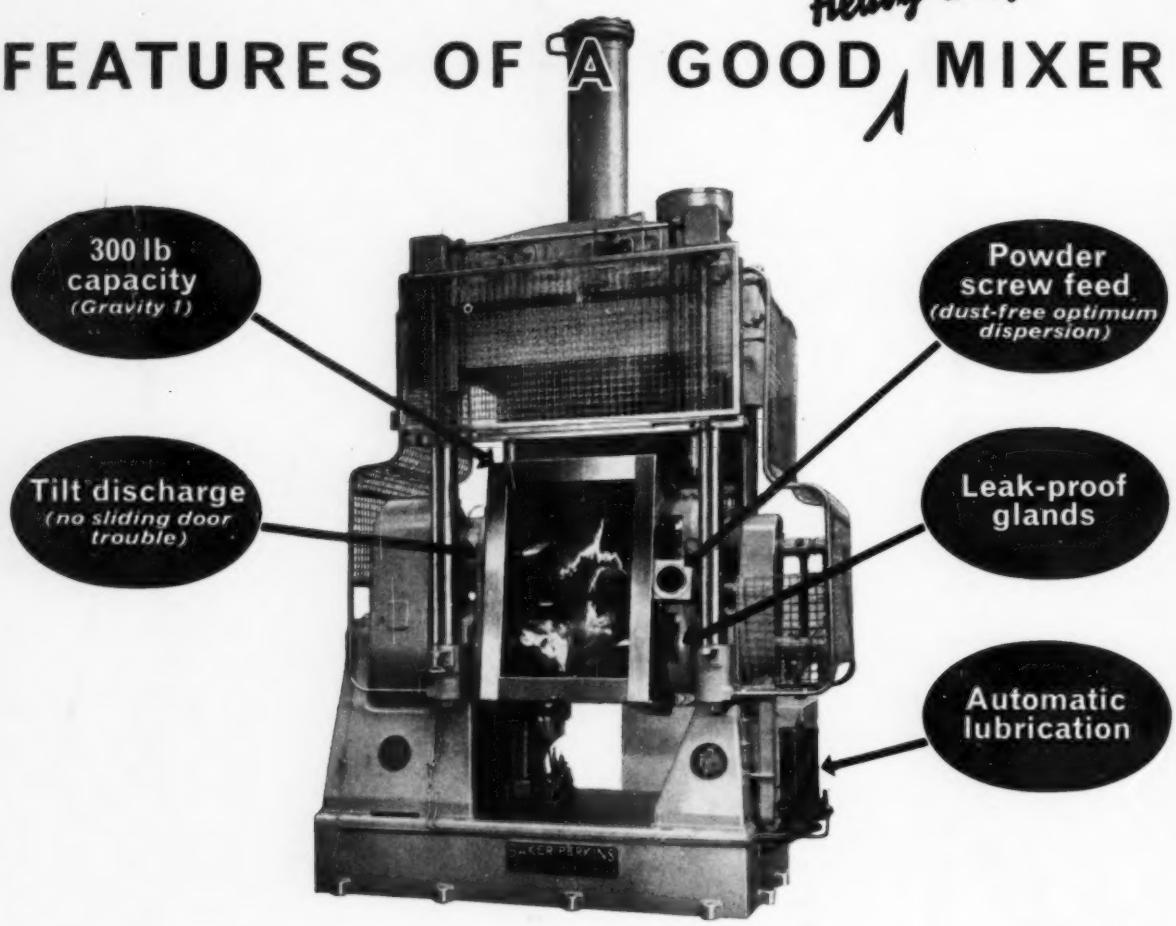
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Automatic lubrication

✻ ***Illustrated is a 300 lb batch mixer; also available are 120 lb and 50 lb machines (Gravity 1)***

The Baker Perkins Rubber Mixer gives top performance and a higher degree of versatility than any other mixer you can buy. It is suitable for rubber mastication, compounding, dough and solution manufacture, and rubber dispersion. You can make colour changes easily and quickly—a change from black to white compound takes only about half an hour. We believe that the cost of this machine in relation to its outstanding features makes it the best proposition of its kind ever offered to the rubber and allied industries.

B.P. 109

BAKER PERKINS Ltd
Engineers
WESTWOOD WORKS · PETERBOROUGH

Printed in Great Britain by F. J. PARSONS, Ltd., London and Hastings, and published by the Proprietors, MACLAREN & SONS, LTD., Maclaren House, 131 Great Suffolk Street, London, S.E.1